THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXVI. No. 911.] LONDON, OCTOBER 26, 1880. [32nd Year. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
ERITH,
OFFICES:
2, CROSBY SQUARE,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
Proprietors: STEVENS & CO.,
21, GREAT WINCHESTER STREET, LONDON.
Works: BRIXHAM, TORBAY.

TUBES.
FIRST PRIZE SYDNEY EXHIBITION 1880
Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Prof. Barff's patent process. Gas-fitters tools, brass cocks, &c.
JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
& 97, CANNON ST., LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
Head London Office:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
Manufacturers of
WET AND DRY GAS-METERS,
Licensees and Manufacturers of
HUNT'S
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.
See Page 638.
CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,

PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.

INTERNATIONAL EXHIBITION,
SYDNEY, 1880.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.
Foreign Agents: DAHL BROS., Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal
A. DEMPSTER, 57, Elizabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS, ROTHERHAM;

AND 85, SOUTHWARK ST., LONDON, S.E.

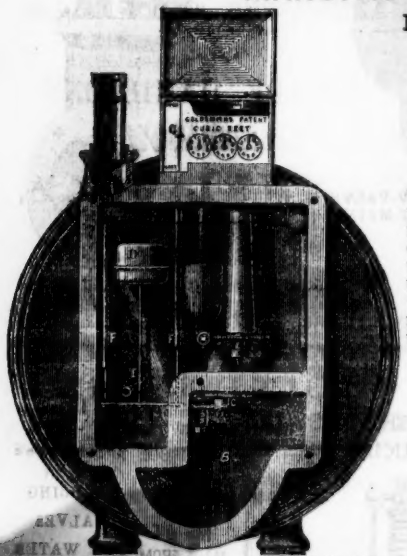


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

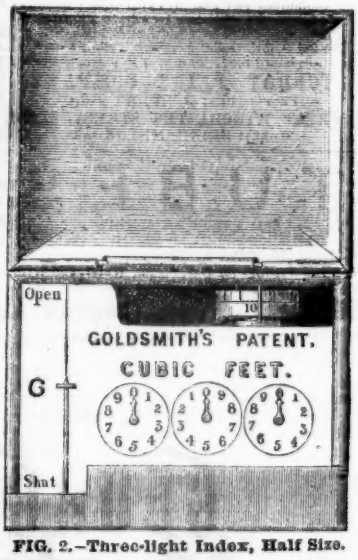


FIG. 2.—Three-light Index, Half Size.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

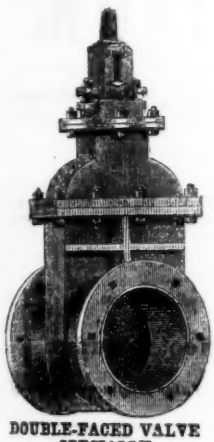
By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

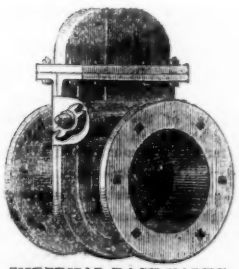
Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

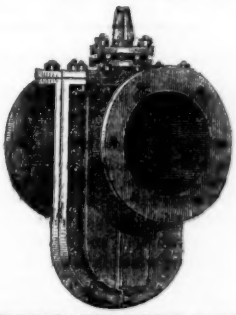
C. & W. WALKERS' GAS-VALVES.



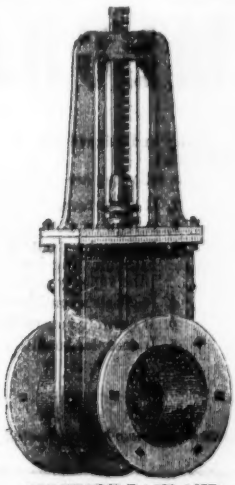
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



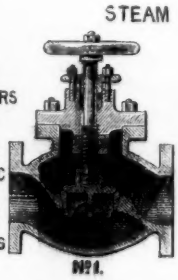
ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

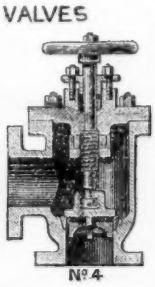
DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

STEAM VALVES

VALVES
RECORDERS
GAUGES
STEAM
PUMPS
HYDRAULIC
LIFTS
BRASS &
IRON
COCKS

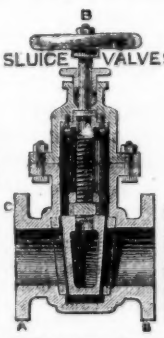


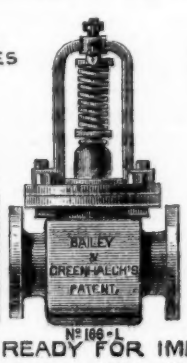
No 1.



No 4.

SLUICE VALVES

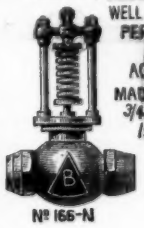




No 166-L

WATER PRESSURE REDUCING VALVES

No 166-M



No 166-N

ADJUSTABLE WELL MADE PERFECT IN ACTION MADE FROM 3/4 in. TO 15 INCHES BORE

BAILEY AND GREENHALGH'S Patent REDUCING VALVES FOR WATER PRESSURE, with or without Flanges in Iron or Brass.

WE KEEP A LARGE STOCK OF VALVES READY FOR IMMEDIATE DELIVERY.

W. & H. BAILEY CO., Valve and Cock Makers, General Brass Founders for Gas and Water Works, ALBION WORKS, SALFORD, MANCHESTER

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

MECHANICAL CONDENSATION.

The undersigned has arranged with Messrs. Pelouze and Audouin the exclusive agency for their patented system of Condensation, in Great Britain and the Colonies.

The following are some of the advantages which this philosophic mode of arresting liquefiable vapours possesses:—

1. It acts irrespective of temperature.
2. It requires no motive power, but automatically adapts itself to production.
3. It may be fixed directly after the hydraulic main, by which prolonged contact of the gas with tar is avoided, and the highest standard of illuminating power is obtained which the coal is capable of giving; or it may be fixed directly after an ordinary air condenser, when it will arrest the vapoury globules which cooling alone will not stop, and the production of tar and ammonia water is thereby increased.
4. It effects a considerable saving in purification, through no tar getting to the material to clog its action.
5. It entirely supersedes the necessity of scrubbers; and if wet sawdust be used in a purifier, washers also are unnecessary.
6. It occupies but little space, and avoids that which is now considered a disadvantage—the too much cooling, scrubbing, and washing of gas.

Further particulars may be obtained of

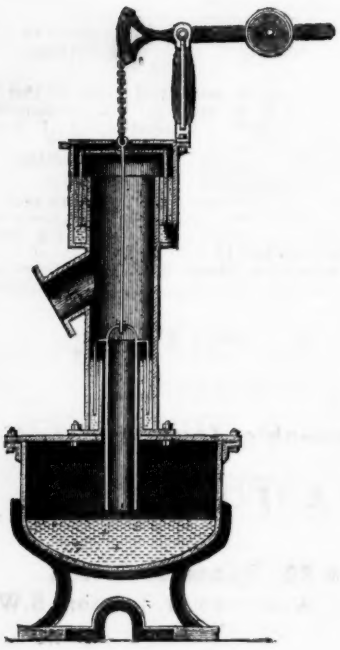
GEO. BOWER, St. Neots, Hunts.

NOTE.—*Gas-works contracted for complete, or apparatus supplied in detail from the retort to the burner.* "*The Gas and Water Engineer's Book of Reference,*" *post free,* 5*s.* "*Handy Abstract of the Public Health Act,* 1875," *post free,* 1*s.*

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

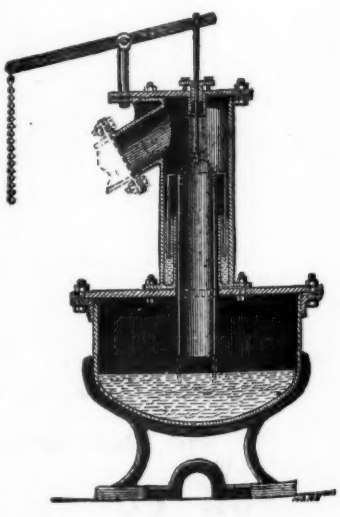
Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure thatI endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,
(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

These Machines, which contain from 3200 feet to 65,000 feet of Wetted Surface, are supplied to the following Gas-Works:—

	Feet per Day.		Feet per Day.
The Gaslight Company, London—		Glossop Company	300,000
Beckton	5,000,000	Holywood Company	125,000
Bromley	7,000,000	Heywood Local Board	600,000
St. Pancras	3,000,000	Leeds Corporation	2,000,000
Bradford Corporation	1,000,000	Leominster Company	150,000
Bremen	150,000	Maidstone Company	1,000,000
Buxton Local Board	250,000	Phœnix Company, Greenwich	2,500,000
Dukinfield Local Board	500,000	„ „ Vauxhall	3,000,000
Driffield Company	100,000	Woolwich Equitable Company	400,000
Goole Company	250,000	Yeadon Company	500,000

And many in course of Construction, among others—

Feet per Day each.	For	Feet per Day each.	For
Four for 3,000,000	Corporation of Leeds.	One for 1,000,000	West Bromwich Improvement [Commissioners.
Three „ 1,750,000	Corporation of Salford. [Station.		
One „ 2,500,000	The Gaslight Co., Shoreditch	One „ 750,000	Radcliffe and Pilkington Gas Co.
Two „ 1,250,000	The Gaslight Company, Beckton.	One „ 500,000	Oldbury Local Board.
One „ 3,000,000	London Gas Co., Nine Elms.	One „ 150,000	Falmouth Gas Company.
One „ 1,250,000	Corporation of Nottingham.	One „ 250,000	European Gas Company, Rouen.
One „ 2,000,000	Cheltenham Gas Company.	One „ 200,000	Deal Gas Company.

TESTIMONIALS.

Messrs. Kirkham and Hersey. *The Gaslight and Coke Company, Beckton, North Woolwich, June* 8, 1880.

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor, and the second with water. Of course the fact of our having ordered two more in addition to the four which we have in use is a sufficient indication of my opinion of the value of the Washer. (Signed) G. C. TREWBY.

Messrs. Kirkham and Hersey. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June* 19, 1880.

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, faithfully yours, (Signed) CORBET WOODALL.

Messrs. Kirkham and Hersey. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug.* 12, 1879.

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free), obtained from a large number of tests, was 241 grains per 100 feet of gas. 'On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

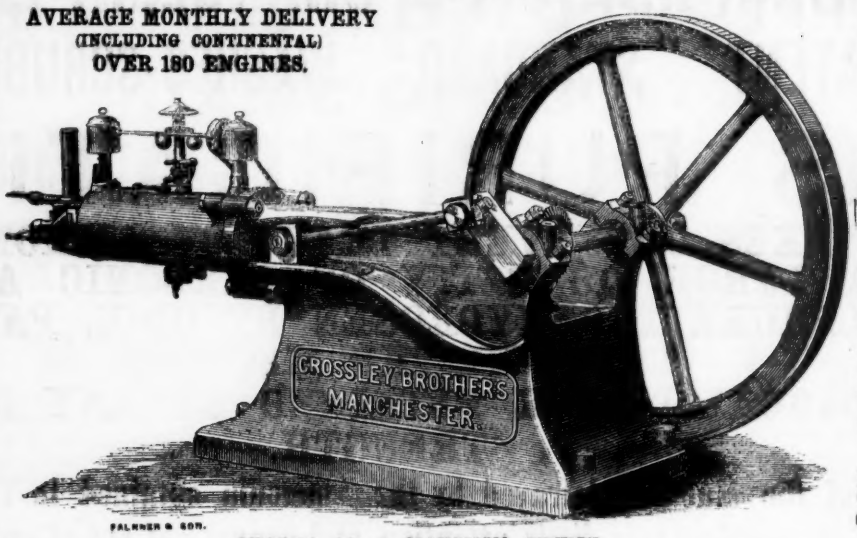
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

These Engines are used at the following Gas-Works:—Birmingham, Brentford, Bucharest, Bishop Stortford, Driffield, Dundalk, Dundee, Dublin, Huddersfield, Hinckley. London—London Gas-Works, Phœnix Gas Co., Gaslight and Coke Co., South Metropolitan Gas Co., Commercial Gas Co., Crystal Palace District. Leominster, Edinburgh and Leith, Ludlow Union, Lancaster, Maidstone, Nuneaton, Northampton, Shanghai, Sheffield, Worcester, Wantage, &c.

AVERAGE MONTHLY DELIVERY
(INCLUDING CONTINENTAL)
OVER 180 ENGINES.



Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE,

From ½ to 40 Horse Power Indicated.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS, MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C.

THE "RELIABLE"

IS

THE PUMP FOR TAR AND THICK FLUIDS.

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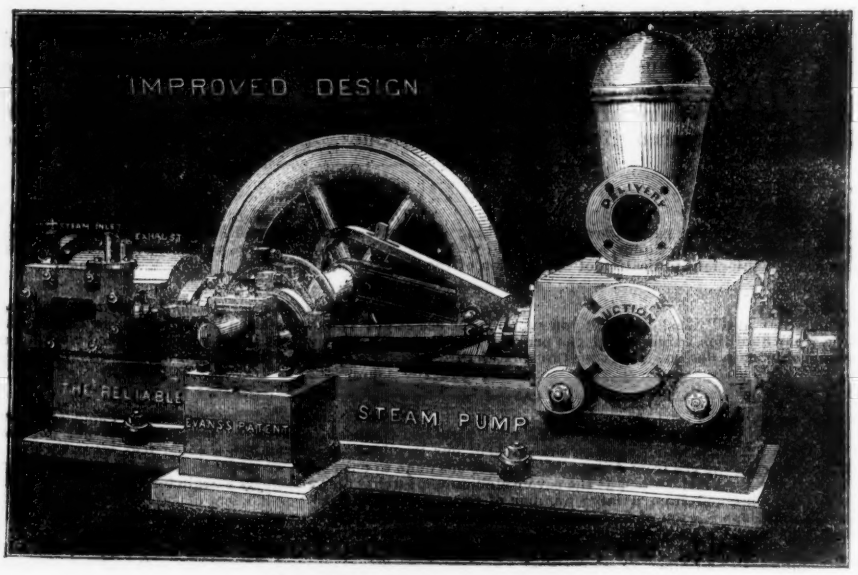

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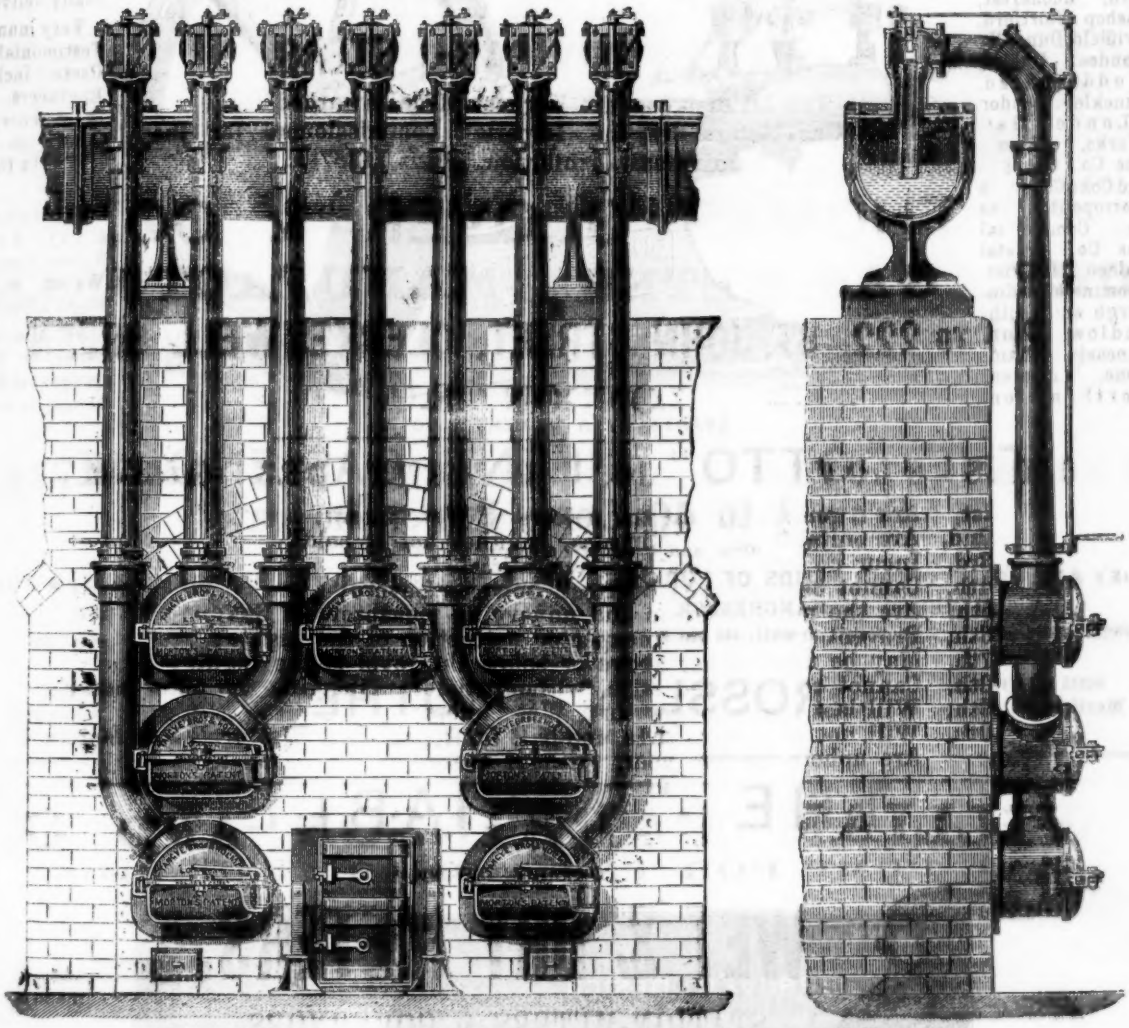
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, because the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

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They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

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London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris 1867.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

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7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
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10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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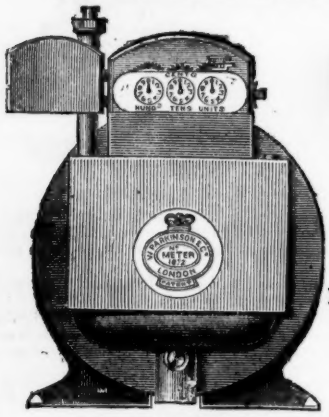
(ESTABLISHED 1816)



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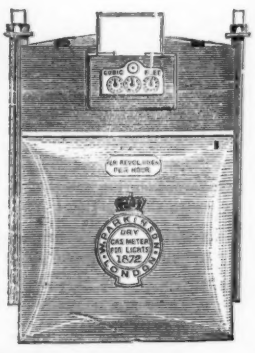

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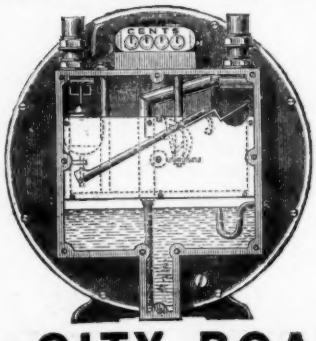
In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

H. S. G.—*Will procure the information for which you ask. See "Trade Notes from Scotland" this week.*

A. F.—*Your letter, being a bare re-iteration of the former one which was published, has been received.*

T. F.—*We are not clear as to the points of divergence between the burner received and others of similar construction. Will you kindly point out the grounds of novelty upon which you desire our opinion.*

J. R. A.—*We should advise you to weigh your coal and coke, and shall be glad to hear further from you when you have arrived at more definite results respecting the working of your furnace as compared with the old system.*

RECEIVED.—"*The Plumber, and Sanitary Houses: A Practical Treatise on the Principles of Internal Plumbing Work, or the Best Means for effectually excluding Noxious Gases from our Houses.*" *By S. Stevens Hellyer. Second Edition. London, B. T. Batsford*; 1880.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 26, 1880.

Circular to Gas Companies.

THE expected Stock Exchange operations on gas stock, accompanying the renewed assurances that electric lighting is shortly to commence its universal reign, have been commenced, but without much prospect of equal success to that which attended the general "bearing" campaign of two years ago. A financial contemporary notices the recent fall in the value of a leading Gas Company's stock, followed immediately by a steady and irrepressible recovery, as a sign that, however vigorously the operators for the fall may have assailed the market, there has been no possibility of forcing on the partial panic, or, at least, permanent depression, which they sought to bring about, to their own advantage and the distress of the holders of gas shares. If the authority in question is correct in this assumption, the discomfiture of a gambling gang is a fit subject for congratulation among every one interested in the preservation of the stability of investments in joint-stock enterprises. We cannot expect that gas property will be more exempt than any other from occasional raids of unprincipled speculators, especially as it has grown of late years into such importance as to have assumed an international interest, the general fluctuations in value of the gas stock in one country being repeated all over the globe. It was permissible to hope that as the price of gas shares in the New York market remained quite unaffected by the recent announcements emanating from Mr. Edison, no more effect would be producible from the same cause in England, and this feeling of confidence has, on the whole, been amply justified. There has been no widespread depreciation in Metropolitan or other gas stock, and the particular instance taken by our contemporary for the text of a homily on the folly of attempting to wreck Gas Companies, may, on the face of it, be due to special causes. Still, the fact of speculators having a covetous eye on the high premiums at which gas shares ordinarily stand, and the certainty that no opportunity of snatching a profit in connection with sudden and violent fluctuations in the value of this class of securities will be overlooked, is sufficient to induce vigilance on the part of those who are equally interested in maintaining them at their normal value. This can, of course, only be done by facing, as it arises, every fresh cause of possible disquietude in the minds of timid Proprietors, and taking care that persons interested on one side do not have all their own way. All gas engineers and responsible officials connected with public or private gas undertakings, must be careful to inform themselves clearly and fairly respecting any new form of electric lighting or other avowed enemy of gas, great or small, in order that they may be at all times ready to correct the garbled accounts and glaring misstatements which are rife whenever public attention is directed to anything new, or professedly new, of the kind. And it should always be remembered that nothing of this nature, however insignificant, can be safely "pooh-poohed" by those who can or ought to be able to dispose of it by convincing argument. The ignorance of the general public on technical matters is profound, and commensurate with this ignorance is the liability to take alarm at shadows not less than at the most portentous realities—the proneness to believe in the solidity of any sham, at least for a time, especially if the fabric of the imposture be principally newspapers. The staleness of an illusion is no guarantee that it will fail to impose on some few people each time it is paraded. It may be that a much-lauded electric lamp is a revival under a new name of some long-forgotten device; or it may even be a startling proposal to make gas out of sewage, or of old bones. All such schemes are in their nature perennial, and are no sooner cut down than they reappear, always to find some fresh believers, and always to be met with the same condemnation. It is due to the interest of the community no less than to their own credit, that gas men should be able to demolish old fallacies in the matter of artificial illumination, and detect the weak points of new ones. And besides the duty of dealing with individual and definite causes of disturbance such as we have indicated, the general confidence of gas Proprietors in their investments is by all means to be maintained by instructing them, whenever occasion serves, in the nature and possibilities of gas in all its ramifications, so that whenever a few street-lamps are lit up by electricity the risk of a panic, or the inward perturbation which leads to a panic, and which is essentially a result of ignorance, may be much diminished, if not altogether removed.

On Thursday last, at Newcastle, a most interesting lecture on electric lighting was delivered by Mr. J. W. Swan, who is Mr. T. A. Edison's rival in the production of a light from incandescent carbon *in vacuo*. We shall give an abstract of the lecture on an early date, and our readers will then be enabled to trace the extraordinary resemblance between the proceedings of the two inventors, carried on, of course, in perfect independence of each other. Mr. Swan has slightly the priority in point of date, and therefore it cannot be said that the unintentional copying belongs to the worker on this side of the Atlantic. This is so far satisfactory, as preventing an otherwise inevitable controversy. No one here is likely to indulge in hard words at Mr. Edison's expense; but it is not so certain that the friends of the latter gentleman would refrain from all imputations against Mr. Swan if caught imitating the Menlo Park luminary. What may be

the true value of either the Swan or the Edison lamp can only be determined by experience, and the sanguine statements of neither inventor are likely to be accepted without further proof of a convincing kind. It is noteworthy that Mr. Swan does not desire the total extinction of gas, even while preparing for it. He, unlike Mr. Edison, sees that the introduction of a new light into the world does not necessarily imply the abolition of any previously known light, unless it be notoriously inefficient, and that is a reservation which certainly cannot be held to apply to gas.

One of the paramount advantages to be conferred by electric lighting, when generally adopted, is to be the complete immunity from the loss of life and property by fire and explosion, which is such an objectionable accompaniment to the use of gas. Such, at least, is the contention of the prophets of the new luminary. How far this dazzling promise is likely to be fulfilled we are slowly learning by the dispassionate testimony of facts. In February of the present year we had occasion to notice the death of a bandsman at Aston, near Birmingham, by an electric shock, stated to have been the consequence of his grasping the connecting wire of an electric lamp while the current was passing. Another victim has now lost his life by the imprudence of touching an electric lamp with both hands. This time the "accident" happened at sea, on board the *Livadia*, the new yacht of the Emperor of Russia, on her passage from the Clyde to Brest. It appears that a stoker was told to hold an electric lamp while it was being swung for lighting the stoke-hole. He obeyed, but in such a manner as to divert the current from the carbons through his own body, and he was instantly struck dead, as by lightning, the disintegration of the animal tissues by the current being such as to render it necessary to bury the body at sea within twenty-four hours from death. The daily papers remark on the impressive nature of the funeral service; but to us and to the public generally the most impressive thing about the melancholy occurrence is the confirmation it affords of the previously recorded fact, that the incautious handling of an electric lamp may result in death of the awful character always attached in the popular mind to a lightning stroke. Death has often occurred in the past, and may at any time happen to persons who are exposed, by their own act or by the acts of others, to the effects of an explosion of gas, or of suffocation by an escape of gas unattended with any explosion; but great recklessness or ignorance must in such cases be exhibited by somebody, and in most instances of the kind there is sufficient warning given to be appreciated by sensible people. In the case of an apparatus which places portable lightning within the reach of an unskilled man who is only doing his duty in holding it, the utter absence of any intimation of the deadly power lying in ambush must be held sufficient to justify the proscription of any apparatus which is not so constructed as to render quite impossible such an accident as that on board the *Livadia*.

The report of the Gas Committee of the Manchester City Council, recommending a reduction of twopence per thousand cubic feet in the price of gas, has been adopted without opposition, and practically without debate; at least, within the Council. Outsiders are not quite so unanimous on the point of the sufficiency of the reduction some discontented consumers arguing that it ought to have been at least a shilling instead of the small sum named, and we confess to sympathy with the minority. Alderman Lamb, the Chairman of the Gas Committee, in moving the adoption of the report, appears to have indulged in disparaging remarks on the quality of the gas supplied to Leeds, and to have blinked the true reason for the disparity of the prices charged in the two places, by implying that gas of no better quality than that of Leeds might be supplied as cheaply in Manchester, if the consumers in the latter place would be content therewith. Now this, as the Alderman very well knew, was only half stating the question. If the gas consumers of Manchester were only charged for gas, and not for the improvements of the city also, they might still have gas of the quality to which they have been accustomed, yet as cheap as that of the Yorkshire town, whose very name appears to stink in the nostrils of Local Government Authorities who do not conduct their business upon sound principles. It should be a cause for congratulation to the Manchester Corporation that they could supply gas not only as cheaply, bulk for bulk, as the Leeds or any other public or private gas undertaking, but even much cheaper, valued on the basis of illuminating power. Advantage should certainly not be taken of this power to draw misleading comparisons, and to endeavour to divert to the distinctions of management, which are generally the growth of local circumstances, considerations which truly apply to the principles of administration, and therefore hold good universally.

The British Gaslight Company must have been fully convinced for some time that their Norwich business is not the least troublesome of all the scattered tributaries to their income; but if they did not feel this before, recent events in that ancient city would suffice to create such an impression. A certain ingenious member in the Norwich Town Council has thought fit to constitute himself censor of the local undertaking belonging to the Company, and some utterances which this gentleman has lately made in his self-constituted office certainly transcend any ordinary criticism. Armed with two statements of accounts furnished by the Company for two successive half-yearly periods—one in accordance with their own system, and the other in the form prescribed by the Act of 1871—he has indulged in some astounding comparisons of the two balance-sheets, elucidating doubtful points, and supplying what he considers omissions, by data drawn from outside sources. The results thus arrived at were announced by him in a speech at a recent meeting of the Council, which earned the honour of a special vote of thanks, and is, perhaps, considered by his friends worthy of being transcribed in letters of gold, and treasured up for ever in the city archives. Opinions may differ as to the value of *ex parte* statements of this kind, and it is impossible for an impartial reader to place implicit confidence in assertions bearing in every line such evidence of strong prejudice as the speech in question. Its general purport may be gathered from the single fact that it swells the profit of £3728 for one half year's working, acknowledged by the Company, into an estimated profit of £12,603. Part of this is made up from the second working statement supplied by the Company, and the remainder is compiled from an alleged illegal charge for depreciation, an excess charged for coke used as fuel, deficiencies in the amounts received for tar and ammoniacal liquor sold, and an excess in the charge for carbonizing. The most unpleasant thing in connection with these matters of working detail is the tacit assumption on the part of the Company's critic that they are not truly represented in the accounts supplied—that, in point of fact, the Directors of the Company have been guilty of fabricating a false statement, and thus eking out wasteful management with positive fraud, entirely for the purpose of hoodwinking the people of Norwich. This is a very grave accusation to be made by any man in the sanctum of a Municipal Council chamber, and lands the accuser in a palpable dilemma. If he can get his allegations sustained, he must proceed to bring the delinquents on their knees, in doing which several negatives will have to be proved; or he must lie under the reproach of having overstated his case, and probably find that in consequence he has ruined a good *primâ facie* claim. As the matter now stands, the immediate effect of the indictment is only the appointment of an Auditor charged with the clearing up the charges now made, by an impartial and trustworthy examination of the Company's books. When this has been done, we shall have firmer grounds than are at present available for determining what wrong, if any, has been committed, and by whom.

The Bench of Justices sitting in Quarter Sessions for East Kent, on Tuesday last, had a difficult case before them in an appeal by the Sheppy Gas Company against the rating of their works and plant, upon a new valuation by the Sheppy Board of Guardians. From £622 10s., the amount of the assessment fixed in 1872, the valuation has been raised by the authority in question to £1496, and this sudden increase of their liabilities was very naturally resented by the Gas Company, who offered to submit to an advance to £1000 in their gross annual value, in order to save an appeal; but this proposal being rejected by the Guardians, the case went to the Justices for decision. The Company contended that the amount of their assessment as it has stood since 1872, when their profits were about £2000, could not be fairly raised two and a half times after an interval which had only seen their profits increased to £2500. But the Guardians objected to their former valuation being taken as a precedent, and acknowledged having made an error in fixing the assessment so low; this error they now sought to correct. The Company further endeavoured, while accepting the principle of assessment known as the value of the concern to a hypothetical tenant, to prove that the allowances which such a person would require to be made from gross returns, before the net value of their business could be arrived at, must be rated considerably higher than usual, in consequence of the unsatisfactory

condition of the larger plant. There were other difficulties to be overcome in fixing the precise financial position of the same imaginary personage, having reference to the amount of floating capital he would require in order to carry on the concern. As explained by Mr. Michael, Q.C., the leading Counsel for the Company, the tenant would, as a matter of course, be allowed deductions of five per cent. for interest on his capital, ten per cent. for profits, and two and a half per cent. for risk of capital. Thus, supposing the amount of tenant's capital to be determined satisfactorily in this particular case, from seventeen to eighteen per cent. would have to be allowed upon it. But as far as the appeal proceeded, it was evident that the real point of divergence between the parties lay in the proportionate charge to be allowed for maintenance of the works and plant. If an average life of forty years were to be taken as the basis of computation, a charge of 2·4 per cent. would be sufficient, according to Counsel, to keep the works in a state of proper repair. But he proceeded to urge that instead of forty years, the life of the Sheppy Company's plant could only be equitably stated at twenty years, involving a charge of 8 per cent., in consequence of the inefficient construction thereof, and the insecure foundation which the site of the works—an alluvial deposit merely—offers for buildings of any kind. This sweeping deduction was not agreed to on the other side, and the question of repairs and expenditure was being hotly debated when a reference of the whole matter to a skilled arbitrator was accepted by both parties, to the evident relief of the Bench, who, by the Chairman, had repeatedly expressed their disinclination to wade through the masses of figures which would have to be brought before them if they had to hear the whole case. There are one or two points of interest in this matter which, when thoroughly gone into before an expert, will be worthy of careful consideration by those who may at any time be placed in the predicament of the Sheppy Gas Company. Without attempting to express an opinion on the question at issue, we may be allowed to hope that the reasons for such a remarkable increase in rating, if maintained, may at least be thoroughly well sifted.

The seventeenth half-yearly meeting of the West of Scotland Association of Gas Managers recently held at Port-Glasgow was up to the average of interest. The address of the President, Mr. R. S. Carlow, will be found in another column, and is a thoughtful commentary on some of the principal topics of interest to gas managers, although containing little matter of novel character. Mr. Carlow is apparently not very favourably disposed towards the steam stoking machinery at present in use for supplanting hand labour, chiefly on the score of the necessary rigidity in the design of settings to be worked thereby. He wishes to see brought out a machine of universal adaptability; and so do a great many others. It may be doubted, however, whether any works where settings of threes and fours are in vogue will ever benefit much by stoking machinery. Mr. Carlow also draws a comparison, unfavourable to Scottish gas undertakings, between their small encouragement of gas for the purposes of cooking and heating, and the proceedings of some English towns in the same direction. There is, of course, much room for improvement in this respect on both sides of the Border; but we hope that, with their facilities, North British towns will soon recover the way which, according to Mr. Carlow, they have at present lost.

A quarterly meeting of the Midland Association of Gas Managers was held at Birmingham on Friday last, Mr. P. Simpson, of Rugby, President of the Association, in the chair. Several subjects of much interest were discussed at the meeting, upon papers read by Mr. Hunt, of Birmingham, Mr. G. E. Stevenson, of Peterborough, and Mr. H. Woodall, of Leeds. Mr. Hunt reported the result of careful experiments he had made as to the comparative diffusive powers possessed by circular and square lanterns, the advantages being in favour of the former shape. Mr. Stevenson dealt with the manufacture of sulphate of ammonia, and Mr. Woodall raised the question of the necessity of charging meter-rents, which he was disposed to favour; but was not followed by Mr. Hunt, or the majority of the members present. The members afterwards visited the new works of the West Bromwich Improvement Commissioners.

To Our Scotch Readers.—Arrangements have now been completed by which Mr. John Allan, of No. 1, Roseneath Terrace, Edinburgh, will represent the Journal as our Correspondent for the North and East of Scotland; and we will thank gas managers and others in those parts to send early intimation to him in future of any matters likely to interest the gas profession at large.

Water and Sanitary Notes.

The Vestry Delegates have once more assembled, under a deep conviction that the Government cannot manage the Water Question without their help. They want to know what the Government intend to do, and what part of the work is to be done by the Vestries. The Government, we apprehend, intend to do very little, so far as the next session is concerned, and the help of the Vestries will not be particularly wanted. It seems to us that the Delegates wish to travel rather faster than the Home Office. Mr. James Beal ought to understand these matters, but even he seems somewhat possessed with the notion that the Government are going at once to introduce a Bill which will transfer the Metropolis Water Supply to "some public body representing the interests of "the consumers." We are aware that the report of the Select Committee of last session is somewhat contradictory on this point, and is therefore hard to be understood; but there are certain passages in it that seem clearly to contemplate the creation of a representative body which shall, in the first instance, consider whether or not there is to be a radical change in the present system of supplying London with water. To this so-called "Authority" will be deputed all those important questions relative to the water supply which people imagined would be settled by the Select Committee of last session, and which the Delegates seem to think were actually so dealt with. But only the fringe of the subject has yet been touched. We are told by one of the morning papers, that "anything less than the creation of the "Water Authority, fairly representing the ratepayers, will not "be tolerated by the inhabitants of London." There may be nothing less, and there may be nothing more. Sir William Harcourt is only pledged to that which is contained in the report of the Select Committee, and in that report it is recommended that the Water Authority "should be entrusted with "the largest discretion as to the best method of dealing with the "Water Supply of the Metropolis." It it added: "Various "courses might be adopted," and first among these is specified the "regulation" of the powers of the existing Companies, "as "in the case of the gas supply." The Water Authority having considered the various modes of proceeding, "further statu-"tory authority would be necessary" to give effect to their conclusions, "so that the judgment of Parliament on any "scheme adopted by the Water Authority would be finally "reserved." If the recommendations of the Select Committee —which are really those of Sir W. Harcourt—are to be adhered to, we cannot see how the eager expectations of the Delegates are to be realized.

Dr. Dixon, the Medical Officer of Health for Bermondsey, has been drawing the attention of his Vestry to the real meaning of certain passages in Dr. Frankland's report on the Metropolis Water Supply for September. Dr. Frankland excepts the water of the Chelsea Company from the condemnation which he pronounces on the water supplied from the Thames by other Companies, the latter being pronounced "unfit for dietetic purposes, owing to the large "quantity of organic matter which it contained." It would appear that from the Thames proceeds both bitter water and sweet, four Companies giving unwholesome water from that source, while against a fifth nothing can be said. The difference, as Dr. Dixon points out, is one of quantity in respect to the organic matter, and this difference he shows amounts to little more than a grain, or "about the weight of a large "pin's head" in ten gallons of water. Dr. Dixon admits that there are certain circumstances under which even this very minute difference might be of great importance; "but," he says, "I have no reason to think it is so "in the present instance." The minuteness of the quantities concerned is shown by the calculation that a man drinking water from the Southwark Company's mains at the rate of a quart a day, must persevere in the process for twenty-one years before he will have consumed one troy ounce of organic carbon, and he must drink on at this rate for 130 years in order to swallow an ounce of organic nitrogen. Of course the mischief is neither in the carbon nor the nitrogen, but in that which may accompany them. At the same time the quantity of these elements, when they are known to proceed from an organic source, is a measure of the peril; and with the index at so low a point, we may infer that the danger is itself infinitesimal. The great evil, as remarked by Dr. Dixon, consists in the pollution which often arises from the neglected condition of the cisterns where the water supply is intermittent.

The Nottingham Corporation may be congratulated on the possession of a well-contrived sewage farm, which, although

not to be looked upon as a source of revenue, affords a satisfactory method for the prevention of a serious and costly nuisance. The land consists of 638 acres on a subsoil of gravel. To this area the sewage of the upper part of Nottingham is conveyed by gravitation, but pumping will be requisite to raise the sewage of the lower portions of the town. The outfall sewer communicating with the farm has been constructed at a cost of £35,000, and passes through the Colwick Hills by means of a tunnel two miles long. At the farm about five miles of main carriers have been constructed of concrete, and from these subsidiary carriers will distribute the sewage over the land for the cultivation of the various crops. About 350 acres of land are now laid out for the reception of sewage, and will be adequate to deal with all that proceeds from the high level. It is calculated that the entire area is capable of receiving the sewage from a population at least double that of Nottingham at the present time, and it is expected that the farm will prove adequate for the next seventy or eighty years. About £70,000 has already been expended in connection with the farm, including the outfall works, and it is reckoned that about £30,000 more will be required, which is the exact amount of the estimate originally prepared by the Engineer of the Nottingham Corporation, Mr. M. Ogle Tarbotton. It is believed the annual loss to the borough will not exceed a rate of twopence or threepence in the pound. At a recent visit paid to the farm by the members of the Town Council, much satisfaction was expressed at the appearance of the undertaking, and great credit was given to the Borough Engineer for the manner in which the enterprise was being carried out. The notions once prevalent as to the creation of a profit out of sewage are now abandoned, and Nottingham is thankful for the prospect of losing no more than will be defrayed by a threepenny rate, while certain other towns have to pay nearly twice as much for a less perfect system.

The sanitary requirements of cities have given rise to the invention of a "destructor," consisting of a specially contrived furnace, in which everything which is to be got rid of is speedily consumed. One of these contrivances is in operation at Jarrow, and the heat generated is so great that it is said to "burn a piece of iron an inch and a half square to "nothing in half an hour." Donkeys, it appears, are harder than iron, for it takes at least four hours to get rid of the carcase of one of these obstinate animals. As a donkey is considerably bigger than the iron cube, perhaps that may account for the difference; yet not wholly so, for a horse, which is bigger than a donkey, disappears in an hour, as also a cow. A pig is gone in a few minutes. Of course, the carcases of horses, cows, pigs, and donkeys are not consumed without special reasons. But articles of the most varied nature find their way to the "destructor." Among these are old beds, boots, and broken-down furniture, as well as defunct cats and dogs. One result of the general combustion is the production of clinkers, which are ground in a mill with lime, producing a species of mortar, or cement, which sells readily at 5s. per ton. The engine which grinds the clinkers has no need of coals to raise steam, the surplus heat of the furnace being more than sufficient for that purpose. The works at Jarrow cost between £4000 and £5000, and the outlay is considered advantageous in its results. A similar contrivance exists at Leeds and elsewhere. A gentleman at Nottingham is the inventor and patentee, and his name is not inappropriately Mr. Fryer.

We learn that the office of Borough Accountant at Bradford is to be filled by Mr. Frederick Sandell, son of Mr. Edward Sandell, of Great George Street, Westminster.

Our commercial contemporary, *Money*, from whom we quoted last week, has the following, headed "Vicissitudes of Gas 'Bears'":—The operators for a fall in gas stocks, of whose probable movements we lately offered a premonitory hint, have suffered a slight calamity during the last few days, the sharpness of which is not alleviated by the consciousness of its retributive character. They tried very hard to reduce the value of honest men's property, and like many other naughty boys who have played with the gas, they have considerably burned their mischievous fingers. Unfortunately for their good intentions, they began their work at the wrong moment, as instead of the fall they had hoped for, there has been a rise of somewhere about £7 per £100 stock, with every indication of a further increase, and the poor "bears" had to go home with their ears somewhat sorer than when they started. The usual preliminary article from Mr. Edison appeared in a recent number of the *North American Review*, and has been reproduced in the London *Globe*, stating that Edison's system of electrical lighting was from the first all that it was originally claimed to be. . . . The public have learned to become familiar with the assurances of this sanguine and enthusiastic inventor, and we shall, probably, have some more of his startling but totally unverified statements shortly, especially should the "bears" find it impossible to buy back what they have sold, in which case sensational telegrams from "America" will, no doubt, be used as a lever with which to force timid investors into parting with their stock.

THE SOUTH METROPOLITAN GAS-WORKS.

Many important extensions and improvements in plant and apparatus having recently been made at the Old Kent Road station of the South Metropolitan Gas Company, by Mr. George Livesey, the Secretary and Engineer, assisted by Mr. Frank Livesey and Mr. J. Somerville, arrangements have been made, by the permission of the former gentleman, for the publication in the JOURNAL of a series of descriptive articles and plates in reference thereto. The subjects which will be so treated will traverse nearly the entire range of practical gas manufacture, and will form a fair epitome of the most modern development of gas engineering as applied in a representative Metropolitan works.

Much interest having been generally manifested throughout the profession, in the large tank and treble-lift gasholder now in course of erection at the Old Kent Road station, we commence the series this week by giving an illustration and abstract of the specification of the concrete tank as originally designed. This, the most important work of the kind yet executed, was treated in the course of its construction as somewhat of an experiment, and the original drawings and specifications were therefore construed, as to the manner of carrying on the work, more as of a directive than as of a controlling character. Many alterations and modifications of the original design were found advisable as the work proceeded, and were freely made, until the tank as completed by the Contractors, Messrs. Docwra and Son, represents the result of the experience of the Engineer and constructors grafted on the original intentions of the former.

We shall next illustrate and describe the tank as it finally stands, pointing out as clearly as possible the deviations that have been made from the drawings now published, and the reasons which led to these modifications.

The following is an abstract of the specification for the proposed concrete tank, 216 feet diameter and 53 ft. 6 in. working depth:—

Four preliminary trial borings have found chalk at a depth ranging from about 46 to 53 feet below the surface of the ground. The top of the finished tank is to be level with the adjoining tank, about 7 feet above the original surface of the ground. Water was found at 11 feet below the surface. Excavation to be carried down to the chalk all round, and on the solid chalk the foundation is to be laid.

The tank to be entirely constructed of Portland cement concrete, in the proportions of 1 of cement to 7 of ballast consisting of about 4 or 4½ parts of gravel and sand from the excavation, and 2½ to 3 parts of clinkers from the retort furnaces which have been saved for the purpose, to be mixed by hand by being turned over twice dry and once wet, and then carefully and solidly placed in position. The rest blocks, 72 in number, to be 18 inches high, and made of concrete. There is to be no dry well. The whole inner surface of the tank to be rendered with neat cement in two coats of an aggregate thickness of not less than 1 inch in any part of the surface; to be made perfectly smooth and hard by close trowelling; 26 bands of 3½ inch by ½ inch bond iron, with the ends turned down and hooked together, to be placed on edge and bedded in the wall 12 inches from the outside at equal distances from bottom to top. The wall to be 5 ft. 6 in. thick at the bottom and gradually tapering to 3 feet at the top; the backing to consist of sand from the excavation, to be made as solid as possible by punning and watering. The base of the gasholder standards being only 4 feet deep, there will be no piers in the tank wall, which will simply be thickened as shown to receive the 24 bases.

The contractor to provide ample pumping power in duplicate; to be responsible for any damage to adjacent buildings, and to fix the holding-down and guide bolts. The timber framing to support the crown of the gasholder to be independent of this contract.

The usual conditions as to time, payment, soundness of the work, alterations, &c., &c., were, of course, inserted, but need not be repeated here.

THE HEAT OF COMBUSTION OF THE GASEOUS HYDROCARBONS.

Among the determinations of physical constants, an important place must be assigned to those which give the exact amount of heat developed by the chemical union of the various elements with each other. Of special interest are the measurements of the heat developed by the combustion of carbon and its compounds; that is, by the chemical union of carbon and the hydrocarbons with oxygen to form oxide of carbon in the one case, and oxide of carbon and oxide of hydrogen in the other.

M. Berthelot has lately determined the heat of combustion of the hydrocarbons which do not liquefy above the freezing point, by exploding them in a steel shell with pure oxygen. The steel vessel, lined on the inside with platinum, is closed with a platinum screw, having in its centre a capillary tube opening below the threads of the screw, and between them and the conical head, which can be pressed down by a turn of the screw into a conical neck, when the gases have been admitted through the capillary tube into the vessel. A platinum wire is brought through a plug of ivory, as an insulator, into the interior, so that an electric spark can be passed between the wire and the interior surface of the shell. The vessel is plunged into a water calorimeter of the form employed by Regnault in determining the specific heats of the elements. A delicate thermometer, by the side of the shell, indicates the temperature gained by the water, from which the heat of combination is calculated in thermal units according to the metric and centigrade scales. The thermal unit is the quantity of heat required to raise 1 gram of water from 0° to 1° C.

When 12 grams of carbon, in the form of diamond, unite with 32 grams of oxygen, the heat developed is 94 units; *i.e.*, enough heat is produced to raise 94 grams of ice-cold water through 1° C. In the following determinations the weight of the combustible taken is proportional to its molecular weight. Carbonic oxide being composed of 12 parts by weight of carbon to 16 parts of oxygen, the heat developed by the combustion of 28 parts by weight of carbonic oxide is compared with the heat produced by the combustion of 12 parts by weight of carbon. By exploding 28 grams of carbonic oxide with 16 grams of oxygen, Berthelot found the heat evolved

to be 68 thermal units. This number agrees admirably with that deduced by Andrews—viz., 68·1 units. Carbon burns directly to carbonic acid, and does not combine with oxygen directly to form carbonic oxide; but since the total heat due to the burning of 12 grams of carbon to carbonic acid is 94 units, and the heat due to the burning of 28 grams of carbonic oxide, containing 12 grams of carbon, to carbonic acid is 68 units, the difference, or 26 units, is the heat due to the union of 12 grams of carbon with 16 of oxygen. By exploding 2 grams of hydrogen with 16 grams of oxygen to form water, the heat of combustion was found to be 69·2 units.

It appears, then, that *equal volumes* of hydrogen and carbonic oxide, when burnt with oxygen, evolve very nearly the same quantity of heat. In the following determinations the weights of the different hydrocarbons exploded are proportional to their molecular weights, so that in each case the thermal result is due to the burning of an equal volume of the combustible:—When 16 grams of marsh gas (CH_4) were exploded with oxygen, they gave 212·4 thermal units as the mean of three experiments; 30 grams of ethane (C_2H_6), prepared by the electrolysis of potassium acetate, gave on explosion 387·4 units; 28 grams of ethylene, or olefiant gas (C_2H_4) gave 340 3 units; 26 grams of acetylene (C_2H_2) gave 315 units. Of the hydrocarbons containing three atoms of carbon the following gases were employed—viz., the paraffin propane (C_3H_8), the olefine propylene (C_3H_6), and the acetylene allylene (C_3H_4). The propane was obtained by the action of concentrated hydriodic acid on cyanhydrate of ethylene, and was separated from hydrogen by dissolving it in absolute alcohol. Of the above, 44 grams of propane evolved 552 heat units in burning to carbonic acid and water; 42 grams of propylene evolved 506 heat units; and 40 grams of allylene, prepared from acetone chlorhydrate, evolved 465 heat units.

Cyanogen gas (C_2N_2) gave, for the combustion of 52 grams, 263 heat units. In 52 grams of cyanogen there are 24 grams of carbon. Now we have seen that 12 grams of carbon burning to carbonic acid evolve 94 heat units, and therefore 24 grains of carbon burning to carbonic acid evolve $94 \times 2 = 188$ heat units. But when cyanogen burns in oxygen, only the carbon is burnt to carbonic acid, while the nitrogen is liberated. The excess of heat evolved by the burning cyanogen is due in part to the separation of the carbon from the nitrogen. We have in this difference, then, a measure of the heat which was absorbed in the union of the carbon and the nitrogen. The measure of heat so obtained by subtraction requires modification in this case for the following reason:—That a certain quantity of the heat developed by the combustion of solid carbon in oxygen is absorbed in vaporizing the carbon—disappears, in fact, as the latent heat of gaseous carbon; whereas the carbon in cyanogen is already gaseous, and (as latent heat) is abstracted from the heat developed by the combustion. But in the case of the hydrocarbons the combustibles and the products of combustion are in the gaseous state, so that the heat of formation of the various compounds can be ascertained with considerable accuracy. In the following table is given a list of combustible gases with their heats of combustion and their heats of formation so deduced:—

Gas.	Formula.	Heat of Combustion.	Heat of Formation.
Hydrogen	H_2	69·0	—
Carbonic oxide . .	CO	68·0	+ 26·0
Cyanogen	C_2N_2	263·0	− 75·0
Marsh gas	CH_4	212·4	+ 19·0
Ethane	C_2H_6	387·4	+ 7·6
Ethylene	C_2H_4	340·3	− 14·3
Acetylene	C_2H_2	315·0	− 58·0
Propane	C_3H_8	552·0	+ 6·0
Propylene	C_3H_6	506·0	− 17·0
Allylene	C_3H_4	465·0	− 45·0

In the last column of the table the sign + means that so many heat units were given out in the formation of a compound, the sign − that so many heat units were absorbed in the formation of a compound.

These numbers show that the heat of combustion of a hydrocarbon is never equal to the sum of the heats of the combustion of its elements. It is less for the hydrocarbons of the paraffin series than for the others—a fact which shows that heat is given out in their formation, and accounts for their relative stability. The union of carbon with hydrogen in the unsaturated hydrocarbons is attended by an absorption of heat, and this absorption is greater in the acetylene series, where two carbon atoms are joined together by three bonds, than in the olefine series, where two carbon atoms are joined together by two bonds. The union of an olefine with hydrogen is therefore attended by an evolution of heat; the reaction between hydrogen and ethylene ($C_2H_4 + H_2 = C_2H_6$) yields 22 heat units, and the reaction between acetylene and hydrogen ($C_2H_2 + H_2 = C_2H_4$) yields 45 heat units.

THE USE OF GAS IN LIGHTHOUSES.

As briefly mentioned in last week's "Notes," there has recently been printed, by order of the House of Commons, a copy of "Correspondence between the Commissioners of Irish Lights, the Trinity House, and the Board of Trade, respecting the Improvement of the Light on, and the Establishment of a Fog Signal at Copeland Island, and the Adoption of Gas instead of Oil as a means of Illuminating that Station." This parliamentary paper, which is the fifth on the subject of the use of gas for lighthouses, contains letters ranging from the 12th of March last year to the 18th of May this year, and is full of interest in many respects, bringing the question down to the latest date.

Briefly stated, the facts are these: About 15 years ago Mr. John R. Wigham, of the firm of Messrs. J. Edmundson and Co., having strongly advised the Commissioners of Irish Lights to use gas instead of oil for their lighthouses, was requested by that body to design a gas-burner for the purpose. He therefore did so, and arranged a burner capable of being increased in power from that of the ordinary lighthouse light suitable for clear weather—namely, 429 candles—to that suitable for the densest fog—nearly equal to 12,000 candles. The highest candle power ever evoked by the largest oil lamp which the lighthouse authorities of Great Britain or the Continent have ever made is only 722 candles, so that the enormous gain to the seaman by the use of gas is self-evident. Such, however, is the prejudice against anything new which is found in certain official minds, that it has been only with very great difficulty that nine of our principal lighthouses have been lighted by gas. The progress of gas lighting for this purpose has been opposed at every step by engineers and others who seem wedded to the old oil-lamp system, insomuch that the Commissioners of Irish Lights became perplexed, and called into their councils Dr. Tyndall, of the Royal Institution, who is the Scientific Adviser to the Board of Trade. His reports from time to time respecting the advances made by Mr. Wigham in his appliances for using gas in lighthouses, coming from so eminent a source, were more than a match for the groundless objectors of the old school, as will be seen from the correspondence we shall quote hereafter.

The present parliamentary paper describes the efforts of the Commissioners of Irish Lights to introduce gas for the illumination of a very important lighthouse at the turning-point of Belfast Lough, and the obstructions with which they were met, although there is hardly a point in the Channel that more requires a powerful light. The Board of Trade, to whom all lighthouse expenditure must be submitted for sanction, without even giving a reason, peremptorily declined to sanction the use of gas, preferring that paraffin should be employed. But the Commissioners maintained their point, and ultimately wrenched a reluctant consent from the Board.

The first of the published letters with which we have to do is one from the Commissioners of Irish Lights, dated July 7, 1879, in reply to a letter from the Board of Trade asking for an estimate of the cost of certain suggested improvements of the light on Copeland Island and the establishment of a fog signal at that station. The Secretary to the Commissioners enclosed estimates prepared by their Engineer "(1) for altering the present catoptric light to a dioptric light burning gas, and a powerful fog 'siren' driven by a gas or caloric engine; (2) for the same order light burning mineral oil, and similar fog signals." In submitting these, he remarked: "I am to convey to you the recommendation of the Commissioners that gas should be adopted as the illuminant at this station—a recommendation which they are strengthened in making by the very interesting report which Professor Tyndall has made to them, on the result of recent gas experiments carried out under his direction at Galley Head, and by the manner in which he therein advocates the extension of the gas system of lighthouse illumination."

The following is the estimate referred to:—

Estimated Cost of altering present Light to a First Order Fixed Dioptric Light.—Cost of Works for Burning Gas, or Mineral Oil in a 6-wick Burner; to work with either System a powerful Fog Siren driven by a Gas Engine or a Caloric Engine.

	Gas.	Mineral Oil.
	Fog Siren worked by a Gas Engine.	Fog Siren worked by a Caloric Engine.
	£ s. d.	£ s. d.
Cost of works	9437 6 9	8470 13 2
Annual maintenance	455 12 9	362 1 4
Ordinary repairs	146 9 8	136 4 4
Special repairs	125 6 11	119 12 4
Interest on estimated outlay, at 3½ per cent.	330 6 2	296 9 6
Total cost of maintenance	1057 15 6	914 7 6

The details of the cost of the works in both instances were given.

In reply to the above-named letter, the Board of Trade replied that, "looking to the considerable excess both as regards first cost and maintenance in the estimate for a gas establishment over that for an oil light," they required of the Commissioners "fuller reasons for their preferring to employ gas at this station." In response to this request, the Board of Trade were furnished with a copy of a report (by their Committee of Inspection) which had been adopted by the Commissioners. The Committee had again considered the question; and being of opinion the light "should be a first-class light capable of being augmented during fogs to the highest pitch at present known," adhered to their recommendation, "founded on the expressed opinion of Dr. Tyndall (in his report on gas), that gas should be the illuminant, it being the only one as yet proved by experience capable of being augmented to duplex or triform, as necessity may require." They stated they did this "notwithstanding the joint report of the Inspector and Engineer," which is printed among the appended documents, and which says they consider "the future use of a 6-wick Trinity burner consuming paraffin oil to be preferable to the adoption of gas, the first cost and annual expenditure for maintenance being much less; the use of oil allowing the light to be made of as distinctive a character as does gas, whilst the adoption of the former illuminant would only entail an expense which would form a necessary portion of a much larger amount required, should a change again be made to gas or electricity." Their report also stated that the estimate given above would need certain modifications which would "swell the gas estimate and lower the

proportion of that for oil." An amended estimate was then ordered to be sent to the Board of Trade, and this was received on the 1st of October, 1879. It showed a reduction in the cost of the oil lighting, owing to the cheapening of mineral oil; but an increase in the gas items, owing to £600 being added for a house for an extra keeper, or mechanic, to attend to the fog signal machinery, also the extra cost of the triform apparatus. The figures stood as under:—

Estimated Cost of altering present Light to a First Order Fixed Dioptric Light.—Cost of Works for Burning Gas in a 48-jet Burner in Triform, with a powerful Siren driven by a Gas Engine; and for Burning Mineral Oil in a 6-wick Burner, with a powerful Siren driven by a Caloric Engine.

	Gas.	Mineral Oil.
	48-jet Burner in Triform, with Siren driven by Gas Engine.	6-wick Burner, with Siren driven by Caloric Engine.
	£ s. d.	£ s. d.
Cost of works	10,211 14 9	8,470 13 2
Annual maintenance	527 3 5	348 2 6
Ordinary repairs	155 7 5	136 4 4
Special repairs	130 18 9	119 12 4
Interest on estimated outlay, at 3½ per cent.	357 8 2	296 9 6
Total cost of maintenance	1,170 17 9	900 8 8

The Board of Trade having written the Elder Brethren of the Trinity Board for their opinion on the proposal of the Irish Commissioners, a reply was sent by Mr. Inglis in the following terms:—

According to their own experience, the Elder Brethren prefer oil to gas as an illuminant, and they consider that if the light be still retained as a fixed light, an intensity equal at least to that of gas can be maintained by means of oil, and even if the biform or triform system were adopted, the oil system is applicable with concentric lamps, as has been shown by the instruments constructed by Mons. Lepeauté, in Paris.

The Elder Brethren do not, therefore, from their own experience, feel disposed to advocate the adoption of gas for illumination at Copeland Island, at all events until its greater economy can be proved; but as respects its employment in working a fog signal, the Elder Brethren have not any experience upon which to form an opinion.

I am to enclose, for the information of the Board of Trade, a statement of expenses for the last financial year at Haisbro' (gas) and Orford (oil) Lighthouses respectively, which appears, in effect, to corroborate the estimates of the Irish Commissioners.

The actual expenditure, from March, 1878, to March, 1879, at the Haisbro' and Orford Lighthouses, referred to above, is appended:—

Haisbro'—Two Gas Lights.

Wages—			
One principal keeper	£77 11 0		
Two assistant keepers, at £63 13s.	127 6 0		
One do. £61 9s.	61 9 0		
One do. £59 16s.	59 16 0		
		£326	2 0
Uniform		20	17 0
Rents—tithes		0	5 4
Coals—			
84 tons cannel, at £1 14s.	£142 16 0		
53 tons furnace, at 16s. 2d.	43 1 3		
Carriage, including town dues	78 16 0		
		264	13 3
Lime		15	5 6
Oil and cleaning stores		13	6 1
Carriage of stores		13	18 7
Coals and fuel for dwellings		44	9 0
Repairs—			
Ordinary		77	11 2
Special		174	6 5
Incidentals		45	16 4
		£996	10 8

Note.—The expenditure for special repairs is a heavy item in the year's account, and might be spread over several years. The charge under incidentals is quite unusual, it generally is less than £15. If, then, were deducted for special repairs £100 0 0; Incidentals 25 0 0 = 125 0 0

The year's expenditure would be £871 10 8

Orford—Two First-class Oil Lights.

Wages—			
One principal keeper	£70 2 6		
One do.	66 0 0		
One assistant keeper	55 0 0		
One do.	54 0 0		
		£245	2 6
Uniform		19	10 0
Oil—			
2211 gallons, at 1s. 3d.	£138 3 9		
Carriage of oil and stores	24 14 11		
		162	18 8
Cleaning stores, &c.		25	0 0
Coals for dwellings		34	9 0
Repairs—general		154	14 8
Boat hire		10	0 0
Incidentals		3	3 0
		£654	17 10

Note.—For 6-wick burner in lieu of 4-wick, add £93.

(This appears to be a very fair average, except that the charge for repairs is rather high.)

The Board of Trade, in a letter to the Trinity House, dated Oct. 13, 1879, stated that they declined to authorize the introduction of gas at the Copeland Island station; and in a letter the same day to the Irish Commissioners conveyed "their sanction to an expenditure of the estimated sum of £8470 13s. 2d. for the purpose of altering the present light at Copeland Island into a first-class dioptric light, burning mineral oil in a 6-wick burner, with a powerful siren driven by a caloric engine." In respect to this letter the Commissioners forwarded to the Board a copy of the following resolutions unanimously passed by them, and asked for an appointment for the deputation alluded to:—

That this Board has read with regret the recommendation of the Board of Trade to light Copeland Island with mineral oil, but cannot see their way to alter their opinions, before expressed, that gas is the best illuminant for this and other important lighthouses. This opinion is borne out by the experience of 14 years trial of the system in the lighthouses under the care of the Board, and is strengthened by the reports of Professor Tyndall, their scientific adviser. In order to explain fully to the Board of Trade the ideas of the Commissioners, that a deputation consisting of the Earl of Meath, Lord Viscount Monck, the Lord Mayor of Dublin, and Mr. Stirling, be appointed to wait upon the Board of Trade to reason with them, and point out why the Commissioners adhere to their opinion that gas is the best illuminant; and that the Secretary be instructed to write to the Board of Trade, asking them to arrange for an early appointment with Lord Sandon.

No opportunity having been afforded for the deputation to meet Lord Sandon, they addressed a letter to him on the 30th of December. This, though very lengthy, we reproduce, because it is so forcible an exposition of the superior advantages of gas over oil, or, for the matter of that, electricity. It was as follows:—

To the Right Hon. the Viscount Sandon, M.P., President of the Board of Trade.

My Lord,—The deputation appointed by the Board of Irish Lights to wait upon the Board of Trade, to explain the grounds on which they so urgently solicit liberty to extend further the development of gas, having unfortunately failed in arranging a time for a meeting with your lordship, which would be convenient to both parties, and foreseeing further the impossibility on the part of the deputation of being able to arrange a meeting amongst themselves for the next two months, have thought it advisable, in the interest of the public service, to place on paper the arguments that impel the Irish Lights Commissioners to seek, without further delay, for permission to develop still more the gas system of illumination, which has been so successfully established in prominent stations on the Irish coast. The deputation, therefore, in the first place, beg to submit the following concise summary of what has taken place of late years, which they are satisfied will bear out their opinion of the superiority of gas over all arrangements of mineral or other oils as yet arrived at.

Gas was first applied at Howth Bailey in 1865, more than 14 years ago, and six other lighthouses—namely, St. John's Point, Rock-a-Bill, Wicklow Head, Hook Tower, Minehead, and Galley Head—have since been lighted with gas. The light has never failed, and its application has given the Commissioners and the seafaring community generally the most unqualified satisfaction. They have abundant proof, from both scientific and practical men, that its introduction has been of incalculable benefit to navigation.

In 1873 the Commissioners determined to extend the advantage of the system to other lighthouses; but certain patent rights of the inventor having to be arranged between the Board of Trade and him, a considerable delay occurred, and it was not till 1876 that the Board of Trade came to an arrangement which enabled them to authorize the Commissioners to proceed with such extension of gas as they might consider desirable to lay before the Board of Trade for their sanction, the Board of Trade, on their part, intimating that they would be prepared to consider favourably any proposition the Commissioners might deem advisable to place before them.

Since then the Commissioners applied for sanction to use gas in three lighthouses—viz., Tory, Fanad, and Copeland Island—the patentee having generously offered, in these cases, to do the work without any charge for royalty; but as great expectation was entertained that the electric light could be so controlled and arranged as to make it the brightest and strongest illuminant known, this Board suggested the postponement for a time of any further action in the matter. Unfortunately the experiments with the electric light have brought out the fact, that although it is undoubtedly the brightest light known in clear weather, it is not by any means proportionately efficient in fog, when danger is greatest, and when light is most wanted by the seaman.

Nothing has occurred since 1865 to alter the opinion of the Commissioners as to the superior value of gas in lighthouses as compared with oil. These advantages have been proved by the experience of 14 years, and during that time the patentee has introduced many important improvements, which have made it additionally valuable, especially to meet the requirements of thick weather, not only in the case of fixed lights, but also in applying the system to revolving lights; in both cases giving to the lighthouse keeper the power of instantaneously increasing the light according as the state of the atmosphere may render it necessary, from a light equal to 430 candles to a light, as in the case of Galley Head, equal to 5000 candles. The Trinity House has recognized these advantages, and has not only had the two houses at Haisbro' lighted by gas on Mr. Wigham's system, but has applied the same principle, to a certain extent, in the introduction of a 6-wick oil lamp, by which the light from oil is increased in thick weather, but to a feeble extent as compared with that attained by gas, and probably very feeble indeed to that attainable by gas in its further development.

As these improvements were brought under the notice of the Commissioners, their scientific adviser, Professor Tyndall, from time to time investigated them, visiting Ireland for this purpose. His reports have been uniformly favourable, and his recommendations for the adoption of these improvements have been acted upon by the Commissioners, with the sanction of the Board of Trade. On the recent occasion of his visit to Galley Head, after giving his own opinion and those of other scientific men in favour of gas for lighthouse purposes, he says: "No words of mine could add any force to the consensus of evidence here brought forward; and when we remember the calamities which have occurred, even in the neighbourhood of lighthouses, through inability to see the light, it surely behoves us not to throw away the chance of mitigating such calamities by the employment of a light capable of behaving in thick weather in the manner described by Sir William Thompson, Mr. Gray, and Mr. Hamilton;" and in describing the effect of the Galley Head light, when it was lost beneath the horizon, he says: "In the cloudy air above the lighthouse every pulse of the flame was distinctly visible after the direct beam had disappeared. I cannot but think that these atmospheric thrills will prove of great importance to the mariner, even in atmospheres thick enough to render the light itself invisible." His impression of the light was this: "On the whole, he had never seen a finer light;" and, in conclusion, he adds, "that gas lends itself with admirable

freedom to any change in its mode of application which it may be thought desirable to make. The suppression, for example, of the flashing apparatus at Galley Head would convert that light into an ordinary revolving light, surpassing any other in the world. Indeed, were the power of the burner reduced to 48 jets instead of 68 jets, the light with its full strength invoked would still transcend all other revolving lights." These facts appear to the Commissioners conclusively to show that they were fully justified in making the recent proposal to use gas in the three lighthouses above referred to, and thus secure to the maritime public the advantages of this superior system of lighthouse illumination; and in this view they are glad to know they are supported by the Elder Brethren of the Trinity House, who state, at the conclusion of the report on the exhaustive experiments made at Haisbro', by direction of the Board of Trade, on the use of gas for lighthouses, that "if called on to advise the Board of Trade in that respect, they would be prepared, in deference alike to the wishes of the Irish Board, and to the strong opinion in its favour of their valued adviser, Dr. Tyndall, to recommend that the Irish Commissioners, who take so great an interest in it, should have authority for the expenses of proceeding further with its development."

The deputation think it their duty to remind the Board of Trade that the principle of sanctioning additional first outlay, when there is a fairly acknowledged expectation of increased benefits to navigation in view, has not only been carried out in the case of these lighthouses already lighted by means of gas, but in those where the electric light is the illuminant. From a parliamentary paper (June 13, 1879) which the Commissioners have lately received, they find valuable evidence given by Mr. Farrer, Secretary to the Board of Trade, Sir Richard Collinson, Deputy-Master to the Trinity House, and Mr. Douglass, its Engineer, respecting the electric light as applied to lighthouses. From this evidence it appears that large sums have been sanctioned by the Board of Trade for experimental trials of the electric light, in view of applying it to lighthouses. The total first cost of the electric light at four stations is as follows:—

First Cost.

Dungeness	£11,600 0 0
Souter Point	17,300 0 0
South Foreland (two towers)	26,000 0 0
Lizard (two towers)	22,500 0 0

Maintenance.

Dungeness	£1588 7 2
Souter Point	1834 16 11
South Foreland (two towers)	2771 9 3
Lizard (two towers)	2305 6 4

Table of Comparative First Cost and Annual Maintenance of Electric and Oil Lights, taking the case of the Lizard Fixed Light, which shows most favourably for the Electric Light.

Lizard (first cost), *one tower*	£11,250 0 0
Compared with oil	6,500 0 0
Shows greater first cost electric light	£4,750 0 0
Lizard, annual maintenance, *one tower*	£1,152 13 2
Compared with oil	681 17 3
Shows greater cost, per annum, electric light	£470 15 11
With regard to the only revolving light—	
Souter Point, first cost, electric light	£17,300 0 0
Oil, similar light	7,000 0 0
Greater first cost electric light	£10,300 0 0
Souter Point, annual maintenance	£1,834 16 11
As against similar oil	719 7 3
Shows greater annual cost of electric light	£1,115 9 8

The deputation beg the Board of Trade to believe that, in bringing forward these figures, they highly appreciate the sound policy of the Board of Trade in thus affording the Elder Brethren facilities to work out a problem—namely, the applicability to lighthouse illumination of the electric light, the solution of which must be of the highest importance to humanity; and that they only refer to them in the sanguine hope that the same opportunity, to a certain limited extent, may be afforded to the Commissioners to work out their gas system, which has already given so fair a promise of proving such a grand boon to the commerce of the United Kingdom. Its superiority in dirty weather and in fogs is well worthy of considerable additional first outlay, and, if it were the fact, in annual maintenance also; but in the annexed statement it is clearly shown that, candle light for candle light, gas is considerably the cheaper; but the Commissioners, feeling the high responsibility placed in their hands, of affording to the large and increasing seafaring population all the improvements in coast illumination that science from time to time develops, have always been anxious to adopt every improvement calculated to save life and property, and in this principle they feel confident they are supported by the general opinion of the country, and they are further fortified in firmly adhering to this principle by the statement of Mr. Farrer, given in evidence before a Committee of the House of Commons, that "the cost of a lighthouse is as nothing compared with its value to the mariner," adding that this is not only his own opinion, but the principle upon which the Board of Trade deals with such expenditure.

In accordance with directions, on the 7th of July, 1879, the Commissioners forwarded to the Board of Trade estimates drawn out by their Engineer of the relative cost of a first order dioptric mineral oil light with powerful fog siren for Copeland Island, and a first order gas light with powerful siren for the same place:—

Estimated cost of gas light	£9437 6 9
" " mineral oil	8470 13 2

The Board of Trade, though strongly urged by the Commissioners to adopt gas, returned an answer that they would only sanction £8470 13s. 2d. for mineral oil. The deputation do not wish to dwell on the dissatisfaction of the Commissioners at this curt decision, unaccompanied by any reasons, but they think it right to state here, that the patentee sent in, without any authorization from the Commissioners, a tender for the erection at Copeland of a first-class dioptric *triform* gas light and powerful siren for a somewhat less sum than that afterwards authorized by the Board of Trade for a mineral oil light, the highest illuminating power of the oil being 722 candles, that of the gas being 1288 candles, including patentee's rights and the new developments of gas not as yet exhibited; the works to be under the superintendence of the Engineer of the Board, and to be approved of by him. This tender the deputation are prepared to lay before the Board of Trade, and to recommend its acceptance.

The deputation have to observe that Copeland Island, being not only a leading light to all going up or down Channel, but also one of considerable importance to vessels seeking shelter in the Bangor roadstead, is situated in a locality where heavy mists and fogs abound during a considerable period of the year; and the deputation beg leave to draw the attention of your Lordship to the following quotation from the report of the Inspecting Committee of this Board, dated Sept. 12, 1879, in reference to this light, in which the deputation fully concur:—"In their opinion this light is one of the most important in Ireland to the large amount of passing shipping, and they therefore consider that it should be a first-class light, capable of being augmented during fogs to the highest pitch at present known. They therefore, notwithstanding the joint report of the Inspector and Engineer (which they recommended to be forwarded to the Board of Trade), adhere to their recommendation, founded on the expressed opinion of Dr. Tyndall in his report on gas, that gas should be the illuminant, it being the only one as yet proved by experience capable of being augmented to duplex or triform, as necessity may require."

The deputation beg to present with these observations a statement, prepared by Mr. Wigham, of the relative cost of mineral oil and gas, in its varied modifications, with comparative power of each in illumination, which is the only just basis on which an opinion can be formed.

[Enclosure.]

MEMORANDUM OF ANNUAL COSTS.

No. 1.—*Paraffin.*

Six-wick lamp, burning three outer wicks only, costs 8s. 8d. per night, for 305 nights (clear weather), say	£132	5	0
Six-wick lamp at full power (foggy weather) costs 11s. 10d. per night, for 60 nights, say	35	12	0
	£167	17	0 per ann.

Maximum illuminating power, 722 candles.

No. 2.—*Triform Gas Light.*

(As recommended by Mr. W. Douglass.)

One 28-jet burner costs 6s. 8½d. per night, for 305 nights, say	£102	6	0
Three 28-jet burners cost £1 0s. 2d. per night, for 60 nights, say	60	10	0
	£162	16	0 per ann.

Maximum illuminating power, 1288 candles.

Cost of paraffin *greater* than gas by £5 1s.

Illuminating power of gas greater than that of paraffin by 566 candles.

No. 3.

One 28-jet burner for 305 nights	£102	6	0
Three 48-jet burners cost £1 16s. 8d. per night, for 60 nights, say	110	0	0
	£212	6	0 per ann.

Maximum illuminating power, 2496 candles.

Cost of paraffin less than gas by £44 9s.

Illuminating power of gas greater than that of paraffin by 1774 candles.

Note.—These figures as to paraffin are taken from the Trinity House Table (Parliamentary Paper C, 1151, 1875), but in this calculation the price of paraffin is reduced to that now paid by the Commissioners of Irish Lights, and instead of taking one-half for the consumption of paraffin in clear weather, I take the actual consumption of the three outside wicks, as it is the three inside wicks which are turned down in clear weather. The consumption of the three outside wicks is much more than half, they being so much greater in circumference. The figures as to gas are also taken from the same parliamentary paper. Particulars of the burners are as under:—

Single Gas-Burners.

Nature of Burner.	Illuminating Power in Candles.	Consumption per Hour in Cubic Feet.	Cost per Hour.	Cost per Night (12 Hours).
			s. d.	£ s. d.
28-jet	429·6	51·4	0 6·78	0 6 8·3
48-jet	832·0	93 2	1 0·2	0 12 3
68-jet	1253 18	146·3	1 7 3	0 19 3·6
88-jet	2408·0	244 0	2 8·2	1 12 2·2
108-jet	2923·4	308·0	3 4·6	2 0 7·8

Triform Gas-Burners.

Nature of Burner.	Illuminating Power in Candles.	Consumption per Hour in Cubic Feet.	Cost per Hour.	Cost. per Night (12 Hours).
			s. d.	£ s. d.
28-jet	1288	154	1 8·3	1 0 2
48-jet	2496	279	3 0·8	1 16 8
68-jet	3759	439	4 10 0	2 17 11
88-jet	7221	752	8 0·6	4 16 7
108-jet	8770	924	10 2·0	6 1 11

Table showing the Comparative Annual Cost of Paraffin and Gas, taking into account the Maximum Illuminating Power in each case.

Annual cost of producing an illuminating power of 100 candles—			
With 6-wick paraffin lamp burning 3 wicks for 305 nights, and 6 wicks (full power) for 60 nights	£23	5	0
With triform gas 28-jet burner for 305 nights, and 2 other 28-jet burners for 60 nights	12	12	9
With triform gas 28-jet burner for 305 nights, and 3 48-jet burners for 60 nights	8	10	1
With triform gas 28-jet burner for 305 nights, and 3 68-jet burners for 60 nights	7	6	9
With triform gas 28-jet burner for 305 nights, and 3 88-jet burners for 60 nights	5	8	6
With triform gas 28-jet burner for 305 nights, and 3 108-jet burners for 60 nights	5	6	8
Or reduced to a unit of *one* candle power.			
Annual cost of producing an illuminating power of *one* candle—			
With paraffin burned as above	4s. 8d.		
With triform gas as above, 28-jet burner	2	6	
" " 48-jet "	1	8	
" " 68-jet "	1	5	
" " 88-jet "	1	1	
" " 108-jet "	1	0	

After considering the matter till the 26th of February, the Secretary of the Board replied, stating:

With reference to Mr. Wigham's tender, I am to point out that the Board of Trade now hear of its existence for the first time, and have hitherto only had before them an estimate for the erection of a gaslight at Copeland Island much higher than that for mineral oil.

As regards Mr. Wigham's statement of the cost of gas, I am to observe that it appears to be open to serious criticism, particularly that portion of it which relates to the use of the triform light with three 28-jet burners for 60 nights in the year. For although in the parliamentary paper relating to the results of the Haisbro' experiments, on which Mr. Wigham's calculations are based, it is estimated that the proportional yearly cost of each

28-jet burner will be only £115 18s. 10d., when an average hourly consumption of as much as 120 cubic feet of gas is required, the whole annual cost of such a station is stated to be £270 13s. 7d., and in the same paper it is distinctly stated that where an average hourly consumption of only 51·4 cubic feet of gas is required, the annual cost will be £186 9s. 4d. for the station.

As Mr. Wigham's estimate appears to assume an average hourly consumption of 68·3 cubic feet of gas, the total cost, adding the cost of the additional quantity of cannel coal and lime required, will be £207 4s. 2d., instead of £162 16s., as stated.

In like manner the cost of the arrangement for introducing the triform gaslight with three 48-jet burners for 60 nights in the year would be £232 9s. 9d. per annum, instead of £212 6s., as stated by Mr. Wigham.

In the experience of the Board of Trade, however, the comparative estimates based upon the experiments at Haisbro' are not borne out, and it is clear, from the lighthouse accounts of the Commissioners at the Board of Trade, that the average annual cost of the six lighthouse stations in Ireland (omitting Galley Head), where gas has been introduced, exceeds the cost of maintaining a station where mineral oil with the 6-wick burners is used, by at least £129 per annum, and that of a station where the illuminant is mineral oil with the 4-wick burner by at least £220 per annum, taking into account the interest on the greater original outlay for gas and the remuneration to Mr. Wigham for the use of his patents.

With regard to the electric light, I am to observe that the Trinity House, on account of the great cost of this mode of illumination, have not hitherto proposed to extend its use beyond the three stations at which it has already been introduced.

The Board of Trade wish to express no final opinion against gas either at Copeland or elsewhere, but they think it only right to be as clear as possible on the subject of cost before proceeding further.

With this object they desire me to request that they may be furnished with an estimate (revised by the Commissioners, with the help of their Engineer) of the first cost of introducing gas at Copeland Island (including the first cost of the fog signal), in the manner now proposed by the Commissioners, and also of the annual cost of maintenance.

But we have carried our extracts from this interesting correspondence far enough for this week, and shall reserve the concluding part of the parliamentary paper to be dealt with in next issue.

Notes.

[*This column is intended to contain miscellaneous memoranda on topics of general professional interest to our readers. We shall be glad to receive for insertion in it any scraps of information, observations of facts, or descriptions of apparatus, &c., which may be worth publication, and yet may not be considered suitable for our "Correspondence" column.*]

Archer's Coal-Whipping Apparatus.

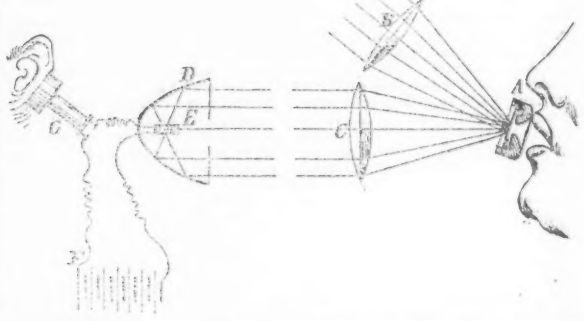
Mr. Thomas Archer, of the Dunston Engine Works Company, Gateshead-on-Tyne, has recently brought out a very effective apparatus for whipping coal, &c., which practically supersedes hand labour for this purpose in vessels fitted with it, and being, moreover, as expeditious as any form of hydraulic or stationary steam-hoisting machinery, it also renders a collier independent as to berth in dock or alongside a pier. A cargo of coal, grain, or any other material that can be discharged by an ordinary winch and derrick may, by the help of this apparatus, be discharged into barges in mid-stream or in the most primitive of harbours, as quickly and economically as alongside a wharf fitted with the most complete appliances for unloading. Although Archer's apparatus may be used for getting out any kind of heavy goods, it is as a means of discharging coal cargoes that it possesses especial claims for notice here. The apparatus is remarkably simple, consisting of a steam-tight drum containing a barrel on which is wound the length of chain required for the hoist, the other end of the chain being attached to a piston fitting in a long barrel or steam cylinder, in connection with the interior of the drum, fixed upright in the hold when fitted for use on board ship. The same shaft that carries the enclosed barrel is prolonged beyond the drum through a stuffing-box, and carries a winding barrel supported in a suitable frame, like that of an ordinary crab-winch. On this barrel is wound the lifting chain after passing over a gin attached to a derrick in the usual way. When ready for hoisting, the piston is drawn up to the top of the cylinder, and upon steam being admitted to the drum, the piston is caused to make a stroke downwards in the cylinder, unwinding the chain from the enclosed barrel, which it consequently causes to revolve, and therefore at the same time the hoisting barrel in connection with it winds up the lifting chain. It will thus be seen that there are no valves or other complicated appliances, the steam inlet being fitted only with a two-way cock for steam and exhaust, and the hoisting work being done in reality by the direct stroke of a steam piston without the intervention of multiplying gear of any kind. The apparatus may be worked at any required speed, and in its manner of working bears a close resemblance to a hydraulic crane. The steamship *Carbon*, trading from the North with coals for the South Metropolitan Gas Company, has been fitted with three of these patent coal-whips, and has discharged twice in the Surrey Commercial Docks entirely by their aid. On her last trip, her cargo of 980 tons was got out into barges, lying alongside in the middle of the dock, in 15 hours, with 28 men employed as fillers and tippers. The same weight of coal, with hand whipping, would take 45 men 20 hours to discharge. The saving in time and labour by the use of the apparatus on shipboard is therefore indisputable, while it may, of course, be adopted for similar purposes in works on shore, as a substitute for hydraulic lifting apparatus; or water pressure, if available, may be used instead of steam as the motive power.

The Kind-Chaudron Plan of Shaft-Sinking.

What is known as the Belgian system of shaft-sinking has been introduced in the Newcastle coal-field for the purpose of penetrating downwards through water-logged strata encountered in the course of sinking a pit at Marsden, between Sunderland and South Shields, by the Whitburn Coal Company. This system of boring, which is really the invention of a German Engineer, Herr Kind, and a Belgian Mining Engineer, M. Chaudron, is much used on the Continent, but the Marsden experiment is stated to be the first instance of its successful application in England. The Whitburn Coal Company were led to its adoption by the failure of the ordinary means for preventing the irruption of water into the shaft, and they appear to be well satisfied with the results of the trial. There are two processes combined in the Kind-Chaudron system—the first, for making the bore, being the special invention of the former gentleman; while the second, for lining the shaft and keeping out the water, is due to the latter, the two being necessary to each other. The boring is performed by a drill, between 6 and 7 feet in diameter, weighing 11 tons, and named a "trepan." The face of the trepan is provided with a line of cutting teeth, or chisels, weighing 3 cwt. each. The trepan is connected by wooden shafting to a rocker at the surface, and it is raised and dropped by steam power, being also turned round at the same time so as to act in a manner precisely similar to that by which a hand-drill is made to penetrate stone. The cuttings are extracted from the bore-hole by a large spoon shell in the usual way. When the trepan has cut its way through the water-bearing strata, a larger one is substituted for it, which enlarges the bore to the size required. The second trepan in the present instance weighed 20 tons, and worked in the same way as the smaller drill. Thus there is no essential difference between the action of a stonemason's hand drill and that of Herr Kind's trepans. The water in the bore-hole is not removed during the progress of the operations, as it assists the cutting action of the chisels. The lining of the shaft is of iron, put together in the mouth of the shaft, and provided with a temporary bottom, which enables it to float on the water in the boring, and allows it to be gradually sunk, as constructed, until it passes below the water-logged strata. This tube being, of course, smaller than the boring, is then backed with cement grout until quite solid. The shaft is thus complete, and quite water-tight. The Kind-Chaudron process has been tried in two shafts at Marsden, in both of which the water-bearing rock was met with at about 110 feet below the surface, and continues to the depth of 380 feet. Fifteen men are employed in the sinking, the average rate of boring being 1 ft. 8 in. with the small drill, and 1 ft. 6 in. with the large drill per day. As will be seen, the apparatus required and the method of making and lining the bore are extremely simple, the magnitude of the boring being alone remarkable. It is stated, however, that by the adoption of this plan valuable coal seams at a great depth below water-logged strata, and otherwise unattainable, have been brought into profitable working.

Professor Bell's Photophone.

In a recent "Note" a brief description was given of Professor Bell's discovery of means whereby the property of selenium of varying in electrical conductivity in proportion to the amount of light to which it is exposed, could be turned to useful account in the transmission of sound and speech. Below is reproduced an illustration, from the *Scientific American*, that shows very clearly the principle upon which the various forms of Bell's photophone have been constructed.

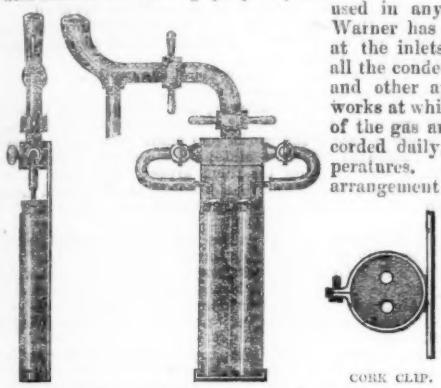


A beam of light from any source, shown in the engraving as coming from above, is concentrated by the lens, B, upon the diaphragm, A, which is made of some material capable of reflecting light and also of vibrating like a drum-head. The diaphragm is placed at such an angle with reference to the incident beam of light passing through the lens, B, as to reflect the light through the lens, C, along the line striking the axis of the parabolic reflector, D. The lens, C, renders the divergent rays of light parallel, and the parabolic reflector concentrates the light upon the selenium cell, E, placed in its focus. The selenium forms a part of an electrical circuit which includes the battery, F, and the receiving telephone, G. A sound made in the vicinity of the transmitting instrument, in connection with which the reflecting diaphragm is fitted up, causes the diaphragm to vibrate, and undulates the reflected beam of light passing through the lens, C, and the consequent variations in the intensity of the light concentrated on the selenium by the parabolic reflector change the electrical conductivity of the selenium, and render the electric current undulatory. These undulations affect the receiving instrument in the same way as it would be affected in an ordinary telephone circuit, and any sounds that may be made in the transmitting instrument are reproduced in the telephone, G. Professor Bell has made about fifty forms of photophone, but the principle of them all is substantially as described. The distance

through which the photophone will work has not been determined; but it is believed that the extreme range will be limited only by the difficulty of adjusting the receiving to the transmitting apparatus when widely separated. Professor Bell has found that various obstacles in the path of the sound-carrying beam act differently on the power of the receiver to reproduce the sounds. A solution of alum or bisulphide of carbon does not diminish the tone produced, but a solution of iodine in bisulphide of carbon cuts off most, but not all of the audible effect. Even an apparently opaque disc of hard india-rubber fails to stop the sounds entirely. The operative rays, whatever they are, have also been able to act through two sheets of hard rubber having a solution of alum between them. Hence some invisible rays are capable of producing the desired effect, although, for convenience sake, Professor Bell has termed his newly-invented apparatus the *photophone*, because the rays of an ordinary beam of light contain those forms of radiant energy which are operative.

Warner's Test-Pipe and Market-Stand Valves.

In a communication read by Mr. W. J. Warner, of South Shields, before the British Association of Gas Managers in 1876, he described a then recently patented invention intended to facilitate the temporary connection of service-pipes to gas-mains. At the late meeting, in Sunderland, of the North of England Gas Managers Association, an adaptation was shown of the valve to the purpose of testing for carbonic acid and sulphuretted hydrogen. The accompanying is an illustration of the appliance as modified to serve this purpose, and also that of taking the pressures. The two joints (shown provided with handles for turning purposes) allow the connecting-pipe to be used in any position. Mr. Warner has the valves fixed at the inlets and outlets of all the condensers, scrubbers, and other apparatus in his works at which the pressures of the gas are taken and recorded daily, with the temperatures. He prefers this arrangement to having fixed gauges, whether at the various points referred to or collected in cases, and the book in which the daily readings are entered forms a record of observations which must be useful for purposes of comparison. There are at present about 400 of these valves fixed, above 200 being in the open market-place of South Shields. The market stall-keepers are enabled to hire the use of a stand-pipe, with one to half-a-dozen lights, at a sum per light varying according to the number required, the Gas Company fixing and removing the stand-pipe, which may be used from dusk to midnight. The trouble attending this arrangement is very slight as far as the Company are concerned; one man fixes and removes the pipes, and collects the tickets for them, which are paid for in advance. For other places than markets these stand-pipes and valves would be extremely useful. Wharves, docks, gardens, and streets where outdoor trading is carried on, might be improved in appearance and even in safety by this means.



Cork clip.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

MR. G. LIVESEY ON THE ECONOMY OF CARBONIZATION.

Sir,—The three letters in the last number of the Journal, on "Economy of Production," will, I am sure, be appreciated by your readers as useful and interesting contributions to the question under discussion.

The point made in the third paragraph of Mr. Stevenson's letter, that high heats mean *quick* production, is good, and well worthy of consideration in an investigation of this question. As to the quantity of tar, I do not consider that a return showing a high make of tar, where there is also a high make of gas, is any proof that as much tar is produced with high heats as with more moderate temperatures. It often happens that with low heats, such as is the case when retorts are first charged, a great quantity of tar is deposited and lost in the mouthpiece, owing to its condensation in the ascension-pipe through the heat not being sufficient to maintain it in the state of vapour until it reaches the hydraulic main. Let it be proved that the quantity of gas can be increased without loss either in quantity or quality of tar, and I at least shall not be sorry to strike the 2d. out of my estimate.

Mr. Stevenson has, I think, misunderstood my estimate of extra fuel. The words were, "Extra fuel estimated *at least* 10 per cent.;" that is, 10 per cent. on the fuel used, not 10 per cent. on the coke made.

I am obliged to Mr. Woodall—the maker of the cheapest gas in the kingdom—for his contribution; he furnishes an element of great importance to the discussion, which I had overlooked. It is a fact within my knowledge that as much as 1s., or even more, per ton has been asked and given for coal, on the ground that such coal produced a greater volume of gas than other coals, that, on the whole, were at least equal to the higher-priced coal.

There is a further evil connected with this competition for a high make per ton. A manager is liable to under-estimate the quantity of coal carbonized, thus landing him in a deficiency when the stock is worked out. I by no means say or suppose that any manager does this intentionally; but where his directors or committee lay great stress on a large make per ton he is not likely to book too many coals—thus leading to the danger of booking too few. Not many things annoy me more than to find a deficiency of coals when the stock is worked out; and my orders are, "Whatever you do, take care to book enough coals. I shall not find fault if at the end of the year there is a moderate surplus."

Bearing on this point, I have taken some interest in comparing the statements of chairmen at meetings with the yearly results; and I have often found a very considerable discrepancy. The chairman has sometimes said they were making 10,400 feet, 10,600 feet, or what not, while the complete accounts showed a very different result, owing no doubt to the chairman's statement being based on the returns of a few weeks, which, from exceptional circumstances or under-booking, did not correspond with the year's working.

This is evidently an intricate question, but there must be an "economical maximum" of production beyond which it will not pay to go. So far the balance seems to incline to a comparatively low make, though I agree with my friend Mr. H. E. Jones that, other things not being forgotten, a good make is one test of good management.

George Livesey.

South Metropolitan Gas Company, 589, Old Kent Road, S.E., Oct. 23, 1880.

Sir,—Referring to the article, on high yields of gas per ton of coals carbonized, communicated by Mr. George Livesey in your issue of the 12th inst., I altogether disagree with his calculations as far as gas companies are concerned whose coals cost as much and whose selling price of gas is as high as with us. I maintain that by making 10,300 feet of gas per ton of coals carbonized, instead of 9800 feet, and using cannel to bring up the illuminating power, we effect a clear gain of more than 1s. per ton of coal, and I would submit the following figures in proof:—

My coals are not of the best, and when making 10,300 feet of gas to the ton, I am obliged to use 6 per cent. of cannel, costing 30s. per ton, to bring the gas up to 15½ candles. This percentage raises the price per ton of coals 1s. all round. But we gain as follows:—

The selling price of 500 feet of gas . .	=	2s. 0d.
Saving in labour	=	0 4
Total		2 4

Or a gain of 1s. 4d. per ton.

I do not deduct anything for extra fuel, as I find no difference between the present time and when we made only 9700 feet of gas per ton of coals carbonized.

Sidney E. Stevenson.

Exeter Gas-Works, Oct. 22, 1880.

THE APPROPRIATION OF GAS PROFITS AT WALSALL.

Sir,—In the Journal of the 12th inst., you made a few remarks concerning our appropriation of gas profits, which I consider decidedly unjust to the ratepayers, who provide capital and manage the business at the lowest possible expense. You appear to think that they ought to do all this, and give the gas consumers the whole of the benefit.

Now, look at each side of this important question. The ratepayers borrow money upon their own property, and by offering such good security can borrow at 4 per cent. The ratepayer has the whole of the liability, and it has been said that the liability can be covered by the price of the gas; but during the electric light "scare" it was pretty clear that gas property went down, and if the electric light had been successful, would the consumers have compensated the ratepayers?

Now, gas consumers borrowing money to erect works for themselves, having no other security than the gas plant, must pay a very much higher rate of interest. Therefore, I think the ratepayer is fairly entitled to a share of the profits equal to the gas consumer, for supplying capital, taking the liability in case of gas being superseded, and for the management.

The gas consumers of Walsall have for many years had the whole of the profits of the gas undertaking, and for quality and price have been served better than any other town. Now we are in a position to do something for the ratepayers without making a difference to gas consumers, and there is no wonder why they do not complain about the appropriation of profits.

I think you cannot justify your remarks, that the Corporation of Walsall are dealing with the gas profits without any consideration being observed between the contributors and recipients, and are robbing Peter to pay Paul. The real fact is, we satisfy "Peter" the gas consumer, and "Paul" the ratepayer and proprietor.

R. W. Brownhill.

Bentley Moor, Walsall, Oct. 13, 1880.

[We can only advise Mr. Brownhill to follow his own advice, and look at both sides of the question. We were under the impression that the gas consumers of Walsall, as in other towns having corporation gas-works, in reality bear all the capital charges of the undertaking, the ratepayers as a distinct body having only a formal responsibility which it is never intended should be a real charge upon them. If there were any danger of the investment failing to pay, it is difficult to believe that local authorities would recommend their constituents to assume the proprietorship of gas undertakings. Mr. Brownhill's remark as to the cheapness of capital raised on the security of the rates is not strictly true. Capital can be obtained on ordinary gas companies security as cheaply as when the ratepayers help is invoked; cheaper when the heavy annual appropriations in aid of local rates, in the Walsall manner, are added to the actual payments for interest and redemption. Lastly, the proportion of receipts to allowances in the case of Bloxwich either means nothing, or it means that people who do not contribute to the revenues of the borough are relieved at the expense of those who do.—Ed. J. G. L.]

Sale of Shares in the Dover Gas Company.—On Thursday, the 14th inst., Messrs. Worsfold and Hayward offered for sale by auction, at Dover, 100 new £10 shares in the Dover Gaslight Company, 61 of which were sold at £15 12s. 6d. each, the remainder at £15 10s. each. The total amount realized by the sale was £1557 12s. 6d.

Legal Intelligence.

EAST KENT QUARTER SESSIONS.—Tuesday, Oct. 19.

(Before the Right Hon. Lord Brabourne, *Chairman, and a Bench of Justices.)*

SHEPPY GAS COMPANY, APPELLANTS, *v.* THE GUARDIANS OF THE SHEPPY UNION AND THE CHURCHWARDENS AND OVERSEERS OF MINSTER, RESPONDENTS.

In this case the Sheppy Gas Company appealed against the rating of their works and plant; the Sheppy Board of Guardians, acting as the Assessment Committee, having, upon a new valuation made by Messrs. Castle and Son, raised the amount of the assessment from £622 10s. to £1496. In preference to appealing, the Company had offered to submit to their gross annual value being advanced to £1000; but the proposed compromise was not favourably entertained by the Guardians.

Mr. W. H. Michael, Q.C., and Mr. Crump appeared for the Appellants; Mr. Castle and Mr. H. F. Dickens for the Respondents.

Mr. Michael, in opening the case, said he appeared to appeal against an enormous increase which had recently been made by the Assessment Committee of the Board of Guardians for the Sheppy Union in the rating of the Sheppy Gas-Works. He was afraid he should have to occupy a great deal of the time of the Court, inasmuch as the Appellants were unfortunately opposed. He would endeavour, as far as possible, to divest the case of its technical aspects, and the only question would be the application of the law as to certain figures. The Sheppy Gas Company was originally a limited liability company. It was incorporated in 1857, and commenced business in 1859. It had supplied Sheerness and Queenborough from that time until the present with gas; and, in 1871, obtained a special Act of Parliament. In 1872 the County Justices ordered a valuation to be made of the works and plant for rating purposes, and the assessment was fixed at £752 gross, and £622 rateable value. This assessment had now been increased to £1898 and £1496 respectively. The Company had raised £4000 of capital bearing a preferential dividend of 4 per cent., and capital to the extent of £20,000 bearing 10 per cent. dividend. Thus they were legally entitled to divide profits on that amount if they could make sufficient to do so. In 1879 they earned a profit which also enabled them to pay 1 per cent. on account of back dividends—dividends which were withheld a few years since, at the time of the coal "famine." Without troubling the Court with the very technical matters associated with the case, he would, with the concurrence of his learned friend, direct attention to two points. The rating of gas hereditaments now proceeded on the same principle as the rating of any other hereditament; but where, as in this case, the company was both landlord and tenant, it was difficult to estimate what would be a fair amount at which to fix the valuation. Therefore a very cumbrous mode of procedure, devised by the ingenuity of the legal mind, had to be adopted, by which a certain person was invented who had never existed, and who was called the "hypothetical tenant." It was endeavoured to ascertain what this fabulous person would give if he were carrying on the business. They had, therefore, to look at the profits, and see what the gas-works earned, and then they had certain deductions to make. These deductions were by universal consensus 5 per cent. interest on the tenant's capital, 10 per cent. for profits, and 2½ per cent. for risks of capital. All the cases for the last dozen years had proceeded on this basis. The real question was what was the amount of capital which a tenant would have to bring into the concern in order to conduct the business on true commercial principles. There was a second and more important point, which was to consider what amount of money should be expended from year to year to keep the hereditament in repair in perpetuity—what sum should be put by, in the nature of a sinking-fund, for renewals, to maintain the works in good condition. Some contention would probably arise upon this point; and he (Mr. Michael) admitted that the case was somewhat complicated, and one which did not ordinarily exist. They had to look at the life of the works, and see what amount of money must be put by to enable the Company to renew their retort-house, purifiers, scrubbers, &c., when necessary. The various portions of such a property had various terms of life, extending from 20 to 50 years, or, taking the medium, it might be put down at about 40 years life. For that period 2·4 per cent. would be amply sufficient to lay by year by year; but if only for 20 years no less a sum than 8 per cent. would be required. Two points then arose. With reference to the first—the amount of capital which the hypothetical tenant must bring in to carry on the concern—he had very little to say. It was thoroughly settled by law, and although he had always been of opinion that sufficient deductions had not been allowed to the tenant, he would take the decided cases without attempting to add to, or take from them. Still, it should be borne in mind that three months must elapse before any return could be received on the first outlay, and a longer period where prompt payment could not be obtained; and the company was obliged to provide meters for the consumers, for which a rent could be charged. Between 17 and 18 per cent., however, was the amount which had to be allowed upon the capital the hypothetical tenant would bring in. With regard to the second point—the keeping up of the establishment—they had a good many guides, both from the transfer of gas-works to public boards and in other ways. But he might lay down this general proposition, that the smaller the concern the larger would be the proportionate amount required to keep it in repair. They had a test in the large Metropolitan Gas Companies and those elsewhere, which were carefully and economically managed. They were enabled to take out the cost of the renewals of these Companies works, and they had done so for many years; and, although in one year the expenditure might be light and in another it might be heavy, according to the character of the renewals, they found that on an average 6d. per 1000 cubic feet was required in order to keep the concern in a proper state. This applied to one branch of renewals; but there was a second head—the repair, renewal, and replacement of buildings and the larger kinds of machinery—for which an additional deduction must be made. It so happened in this case that the Sheppy Gas Company had built their works in a very insecure position, without a proper foundation, upon alluvial soil on the banks of the Swale; and they were far from efficiently constructed. An enormous sum would thus have to be expended to put them in a thoroughly sound condition. No money had been spent on them for some years, and they had now become in a scandalous state of non-repair, so that instead of calculating the renewals and repairs on a 40 years life, they were obliged to calculate them upon a 20 years life, and they were therefore under the necessity of asking for 8 instead of 2·4 per cent. The works were in such a condition that no hypothetical tenant would come there unless such an allowance were made. In 1872, when the works were assessed at £622, upon the valuation made by order of the Justices, the profits were only £2000. Now they were £2500; but a very large expense must shortly be undertaken in rebuilding the works, unless the whole of the district—comprising Sheerness and Queenborough—was to be left in darkness. Under these circumstances, he would ask the Court to reduce the rating in accordance with the evidence of the skilled valuers who would be called as witnesses.

Mr. *A. W. Marks*, the Secretary to the Company, produced the accounts. Whereupon

Mr. Castle said it would be much more convenient for the Respondents to leave the question of accounts until they had had an opportunity of going into them, so that the time of the Court might be saved.

Mr. Michael said the Appellants did not wish to conceal anything, and he was quite willing to recall Mr. Marks at any time.

The Chairman: It is a most difficult case for the Court to deal with; and probably in the end it will be only a matter of figures, and will resolve into a question of opinion.

Mr. Michael: They know every single figure of the accounts, and we have been ready and willing to give them all the information in our power. The real question is why they should now raise the assessment from £622 to £1496—multiplying it by 2½ "at one fell swoop."

Mr. Castle: My learned friend is assuming that the 1872 rating was perfectly correct, because the Company has been paying upon the amount up to this time. That is so far to their benefit; but I shall be able to show that the former assessment was radically wrong.

The Chairman: That shows a difference of opinion between surveyors. What will it be, then, in the case of magistrates?

Mr. Castle thought the real question at issue was very simple, if his lordship would allow the case to go on.

The Chairman: Certainly; but I think it is an enormous pity that a bench of magistrates should be asked to decide on figures. It is a question which is more properly one for reference to an expert.

Mr. Michael said he quite agreed with his lordship's remark, and would be glad to fall in with such an arrangement.

Mr. Castle said he thought it would save much delay and expense if the matter were at once gone into and decided, instead of being referred.

Mr. Michael was quite willing for the matter to go to reference to some gentleman selected by both sides, and to be bound by his decision.

Mr. Castle said the expense of reference was an obstacle. He appeared for a public body having the public interest at heart.

The Chairman said they all had the public interest at heart, but he thought it was a pity such cases should be brought into court at all.

Mr. Castle thought the Court would be able to settle the case, as the question with which they had to deal was the amount of capital required by the Company to carry on their works.

Mr. Michael: Mr. Marks does not know about the capital.

Mr. Castle: Mr. Marks knows a great deal, Sir.

Proceeding to cross-examine the witness, Mr. Castle said: I observe that the first paragraph in the report of the Directors of the Company for the year 1879 states that "the works and plant have been carefully maintained in a thoroughly efficient state, all necessary repairs having been carried out as the occasion for them arose;" and that "a new storeage tank for ammoniacal liquor has been constructed, and the old heat shaft, which had become dangerous, pulled down and rebuilt." Is that true?

Witness: It was believed to be true at the time the report was written.

Having been "carefully maintained in a thoroughly efficient state" until the close of the year 1879, have the works now become in the "scandalous state of non-repair" described by Mr. Michael in his opening speech?—As Secretary and Accountant of the Company, I am unable to say.

Are they in a "scandalous state of non-repair"?—Not being an Engineer, I cannot tell.

But you are the Secretary of the Company, and it would be your duty to go round the works from time to time. Now, are they in such a state?—I cannot answer such a question, but they are in a very bad state of repair.

You signed the report?—Yes.

Well, then, please "don't burk" the question.

Mr. Michael: You have no right to say that.

Mr. Castle (to witness): Are the works in a "scandalous state of non-repair"?

Witness: They are in a state needing a large outlay.

Then you will not now stand to what you put your name to?—At the time the report was written it was the impression of the Directors and myself that the works were in a good state.

Mr. Michael pointed out that Mr. Marks being Secretary to the Company, and not an Engineer, he could not possibly say much about the condition of the works. As to his signature being attached to the balance-sheet and report, that was only on behalf of the Directors.

Cross-examination continued: During the year 1879 the sum of £515 8s. 8d. was expended for repairs. The amount shown in the statement of income and expenditure for repairs, renewals, &c., is £435 17s. 6d. The latter was the amount actually expended; but I believe there were amounts which were not paid that were properly chargeable to the year's trade.

Mr. Castle: Was it a fact that the difference between these two sums represented the amount allowed as landlord's charge for the deterioration of the works?

Before witness replied,

Mr. Michael, interposing, said it would take two days to complete the case, and then no satisfactory conclusion would be arrived at.

The Chairman stated that, although he was willing to sit as long as might be necessary to hear the case, he felt that it was one which could only be properly tried by its being referred to experts, who would be familiar with the figures and facts necessary to arrive at a conclusion. In a matter of this kind, he did not feel the confidence in himself which he should in ordinary cases.

After some conversation between the learned Counsel, it was decided to refer the case to Mr. John Clutton to report to the Court; or, failing that gentleman, to Mr. Powell; or, failing both of them, to Sir Henry Hunt.

The jurisdiction of the Court, as to costs both of appeal and reference, was reserved by consent.

The appeal was accordingly adjourned until the January Sessions.

[The witnesses for the Company included Mr. R. P. Spice, C.E., Mr. Alfred Penny, C.E., and Mr. Ryde, the eminent Land Surveyor. For the Assessment Committee there were Mr. Castle, sen., of the firm of Castle and Son, and Mr. G. W. Stevenson, C.E.]

SHREWSBURY POLICE COURT.—Monday, Oct. 18.

(Before Messrs. H. Sandford *and* J. Watton.)

CONVICTION FOR STEALING GAS.

William Henry Taylor was brought up in custody on a warrant charging him with having, between the 1st of September and the 11th of October last, feloniously stolen 2000 cubic feet of gas amounting to the value of 6s., belonging to the Shrewsbury Gaslight Company.

From the evidence of William James, a meter inspector, and James Mason, a fitter in the employ of the Company, it appears that, about half-past eight o'clock on the previous Monday morning, the former went to the prisoner's house, but could not gain admittance. He returned later on, and finding the prisoner in, told him he wanted to go down into the cellar to see the gas. Prisoner said, "Mr. James, you know that I have not used gas for the last two years." James, however, insisted on going down, and

ultimately did so, the prisoner following him. A pipe produced was the piece of pipe found in the cellar. It was open, and an india-rubber tube was attached to the pipe. James said, "Mr. Taylor, what is the meaning of this—using our gas in this way?" Taylor replied, "I think I have done no harm in so doing;" and on James telling him that he must consider it a case of felony, Taylor said he was very sorry, but he had only connected the gas about a month, and hoped James would not say anything about it. The inspector then went upstairs, and called Mason to look at the gas-pipe. Mason and James went down together, and in the presence of both of them prisoner made the remark about only burning the gas two months. Acting on further instructions, James returned to the defendant's house, and took Mason with him. When he arrived there he found the india-rubber tube had been taken off, and the lead one hammered up. His impression as to the india-rubber tube was that it had been used a considerable time, for the gas had nearly made it black inside, but he could not venture to say how long; yet he was sure it would be more than a month. When the gas was turned on, he thought that about 80 to 100 feet of gas would pass through the tube in an hour. From the prisoner's own statement that he had burned it about a month, the Company valued the gas at 6s.; but the exact amount could not be ascertained, as the gas-meter had been taken away in June, 1878.

On the prisoner being asked whether he wished the case to be dealt with summarily, or sent before a jury, he answered that he would rather have it decided at once. He pleaded guilty, and said he did not burn half the gas that was said to have been used. He hoped the Bench would deal leniently with him, as they had before them a document containing many good recommendations and characters.

Mr. SANDFORD said this was one of the most distressing cases that had ever come before a bench of magistrates, and it was the more distressing when the defendant had produced to them so many testimonies to good character. He (Mr. Sandford) was glad in one respect that under a new Act of Parliament they could fine him; but if it had not been for this Act they would have had no other alternative than to commit him to prison. He would be fined £5 and the costs, or in default two months imprisonment with hard labour.

The Company declined to accept costs for their witnesses, but the expenses of a detective going to Birmingham to apprehend Taylor were allowed.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

MEETING OF VESTRY DELEGATES.

A Meeting of Delegates from various Vestries and District Boards of the Metropolis was held on Wednesday last, in the St. Martin's Vestry Hall, for the purpose of considering the steps to be taken in the next session of Parliament, in the interests of the ratepayers, with regard to the question of Water Supply.

Mr. E. J. WATHERSTON presided, and, in opening the proceedings, referred to the action taken upon this question by the Government last session, and to the report of the Select Committee which had been appointed as the result of that action. He offered the following suggestions to the meeting:—(1) That a communication be addressed to the Home Secretary, to learn whether the necessary parliamentary notices were to be given for a Bill to be indroduced next session; and (2) that an Honorary Secretary be appointed, with instructions to communicate with the authorities of the great towns that had acquired water-works, to obtain their financial results.

Mr. J. BEAL moved—"That as the report of the Committee of Session II., 1880, on the London Water Supply, recommends that the Government should introduce a Bill to constitute a Water Authority of a representative character, in order that the supply of water in London should be under the control of some public body representing the interests of the consumers, a communication should be addressed to the Home Secretary to learn if notice of such Bill will be given by him and limited to such object."

Mr. BERRY seconded the motion, and it was carried.

Mr. BEAL next moved—"That the Home Secretary be invited to state whether he will undertake to present the requisite evidence, and whether he will arrange between this and the meeting of Parliament for a valuation of the works and plant of the Companies, for a completion of the audit to the 31st of December of the accounts of all the Companies, and for a report on the present condition of their works, and for the outlay requisite for their transfer in perfect order."

Mr. MORTON seconded the motion, but its further consideration was deferred.

Mr. Beal was then appointed Honorary Secretary, and the proceedings were adjourned until the 3rd prox.

THE "ORGANIC MATTER" BUGBEAR.

At the Meeting of the Bermondsey Vestry on Monday last week, Dr. Dixon, the Medical Officer of Health, presented a report in which was the following reference to the quality of the Metropolitan Water Supply:—

"Dr. Frankland reports, as the result of his analyses of the water supplied to the Metropolis during September, as follows:—'Except the supply sent out by the Chelsea Company, all the water drawn from the Thames, although in every case efficiently filtered, was again unfit for dietetic purposes, owing to the large quantity of organic matter which it contained.'

"The difference between water which is fit for domestic use and water which is not, is exceedingly minute. It is a question of the quality and condition of the organic matter rather than of its exact quantity. In this case, as all the water is derived from the same source, the nature of the organic constituents must be of similar quality. The difference in the quantity of the organic elements in the Chelsea water, which is approved of, and that of the Southwark Company, which is condemned, is little more than one grain (1·162), or about the weight of a large pin's head, in ten gallons of water. Under certain circumstances, even this very minute difference might be of great importance; but I have no reason to think it is so in the present instance. When water is not properly stored, animal and vegetable organisms are rapidly developed, and the water soon becomes highly charged with organic impurities, which may or may not be injurious to health. The filth accumulates and grows in the cisterns.

"In the present condition of the Southwark water, when properly filtered, and as it flows from the mains, a man must drink a quart of it every day for 21 years before he will have consumed one ounce (troy weight) of organic carbon, and he must do the same for 130 years to finish his first ounce of organic nitrogen.

"The only remedy for objectionable cisterns is the constant supply system, which is being gradually adopted by most of the Water Companies from motives of economy; but I know no reason why the process should not be accelerated for the benefit of the public."

CHIRK WATER COMPANY, LIMITED.—A company under this title has recently been registered with a capital of £3000 in £10 shares.

SINGAPORE GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held at the City Terminus Hotel, E.C., on Tuesday last—H. P. STEPHENSON, Esq., in the chair.

The SECRETARY and ENGINEER (Mr. Robert King) read the notice convening the meeting, and the following report of the Directors was taken as read:—

The Directors have to report continued progress in the lighting of Singapore, for particulars of which they refer to the report annexed, from their Engineer and Manager, Mr. E. J. Wells, dated Aug. 18, 1880.

The balance-sheet to June 30, 1880, appended to this report, shows the financial position of the Company. The Directors have written off for depreciation of works and plant at the rate of 1 per cent. per annum, and £100 for depreciation of fittings. The profit for the half year, after writing off these sums, amounts to £2461 9s. 1d., which together with £848 16s. 10d., the unappropriated profit of the preceding half year, makes the available balance £3310 5s. 11d. Out of this sum the Directors recommend the declaration of a dividend at the rate of 7½ per cent. per annum, less income-tax, on the preference capital, and at the rate of 8 per cent. per annum, less income-tax, on the ordinary capital; the balance of £878 5s. 2d. to be carried forward to the profit of the succeeding half year.

Report of the Engineer and Manager.

Gas-Works, Singapore, Aug. 18, 1880.

Gentlemen,—I have great pleasure in submitting to you the balance-sheet and statement of accounts showing the working for the half year ending the 30th of June last, which I trust you will find correct.

The working, on the whole, may be considered satisfactory, although we cannot show the increase in gas-rental that I should have liked to do; indeed, I am sometimes surprised that we hold our own so well as we do. We have not the electric light to contend with, but we have what in Eastern towns are far more powerful with the natives—cheap petroleum and lamps. Lamps can be purchased in the Bazaar at 50 cents each, and petroleum at 1·60 dols. per case of 8 imperial gallons, while a large quantity has been sold at 1·35 dols. per case So you will perceive that we have to contend with a powerful opponent in petroleum.

You, no doubt, noted that at the commencement of the half year the monthly rental was lower than usual. The last three months, however, show a great improvement, which still continues. In a town like Singapore fluctuations in rental must be expected.

The works, buildings, and apparatus generally are in efficient condition and in a good state of repair. All the retort-settings are ready for work whenever they may be required; those in use at present will run three months longer. In the purifying department all is working well; the two new purifiers have proved a great advantage, enabling three to be constantly at work, and allowing ample time to change the fourth.

An extension of mains with the erection of 18 public lamps is ordered for Sirangoon Road, and a further number of lamps—about 10—will be required in a road where the main is already laid. Fourteen additional lamps have been erected during the half year, making the total number erected 495. Twenty-nine houses have been fitted up during the half year, and 495 lights fixed. The fitters are fully employed, and for the next fortnight we shall have our hands full, as the Chinese illuminations commenced last evening, and will continue for 14 days.

During the half year an examination of many of the services has been made, and a number of them renewed. About half the services in the town have now been examined. The unaccounted-for gas, including the consumption on the works, has been 12¼ per cent.

In my last report I mentioned the serious illness of my assistant, Mr. Coveney. I regret to say that his illness terminated fatally on the 16th of February.

In conclusion, I trust that all the accounts will be found correct, and that the Directors will be able to maintain the dividend at the same rate as last half year.

(Signed) E. J. WELLS, Manager.

Balance-Sheet, June 30, 1880.

Dr.		Cr.	
Capital—		Works & plant Dec. 31, 1879	£45,393 8 0
2,000 preference shares, £5 paid . . .	£10,000 0 0	Extensions this half year .	329 11 7
10,597 ordinary shares, £5 paid	52,985 9 0		£45,722 19 7
		Less amount written off. .	226 19 4
12,597 shares	£62,985 0 0		£45,496 0 3
Debenture bonds. . . .	100 0 0	Purchase of land	1,118 2 8
Sundry creditors	662 10 10	Cash at Bankers, London	
Insurance reserve-fund. .	236 14 6	and Singapore	516 12 11
Profit and loss.	3,310 5 11	Cash in hands of Secretary .	42 7 11
		Bills receivable	800 0 0
		Office furniture	79 14 6
		Retort account	955 5 0
		Meter renewal account . .	64 8 2
		Stock on hand.	11,787 15 0
		Gas and meter rental, &c.—	
		Due to June 1	5,073 17 4
		Due for month of June .	1,599 7 6
	£67,294 11 3		£67,294 11 3

Profit and Loss Account, from Jan. 1 *to June* 30, 1880.

Coal carbonized	£2,291 2 10	Balance at profit and loss,	
Lime and oxide	22 2 0	Dec. 31, 1879	£3,291 5 6
Trade and general charges.	401 14 8	Less amount declared as	
Rent, rates, and taxes . .	149 17 5	dividend	2,442 8 8
Directors and Auditors . .	310 10 0		£848 16 10
Salaries and Collectors commission	839 2 5	Gas and meter rental . .	6,613 3 0
Wages	445 15 3	Products, profit on fittings,	
Interest on loans and debentures	16 11 7	and sundries	1,534 8 2
Loss on exchange . . .	426 11 4		
Bad debts and allowances .	105 15 0		
Travelling expenses . . .	90 0 0		
Retort account	170 0 0		
Meter repairs and renewals.	75 0 0		
Depreciation on works, plant, &c.	326 19 4		
Office furniture	5 0 0		
Balance, profit	3,310 5 11		
	£8,986 8 0		£8,986 8 0

The CHAIRMAN, in moving the adoption of the report, said it presented the very satisfactory feature of a reduced loss on exchange of £608; but, on the other hand, they had the drawback of a diminished gas and meter rental of £133, which arose from the decreased consumption in the early months of the half year. The residual products, profit on fittings, and sundries also showed a decrease of £175. He was glad to say that towards the end of the half year the gas and meter rental began to resume its normal condition, and in the first month of the current half year, not mentioned in the accounts, there was an increase. The Directors also had the agreeable information that additional streets were to be lighted, and they had sent out more lamp-posts and mains for the purpose. They had also the knowledge that at the present time the Municipal Commissioners had under their consideration the lighting up of certain new portions of Singapore previously mentioned.

Mr. R. S. FOREMAN seconded the motion, which was unanimously agreed to.

The CHAIRMAN then moved the declaration of a dividend of 8 per cent. per annum on the ordinary shares, and 7½ per cent. on the preference shares, less income-tax in both cases.

Mr. FOREMAN seconded the motion, and it was agreed to.

The CHAIRMAN then moved that the thanks of the meeting be given to the Local Committee at Singapore; and also to the Manager, for the very efficient way in which he carried on the Company's business. His attention had been directed to reducing the stocks, and he did do so in the past half year; but on the present occasion the stock was somewhat increased. The Directors had again called his attention to the large quantity of coal

in store; but it must be remembered that it was a source of safety to the Company to have a large stock in hand. The Manager took advantage of fortunate sales, and notably of late in reference to a cargo from Japan, which he purchased in dollars instead of pounds sterling. This was a great advantage to the Company. He thought the Shareholders had considerable satisfaction in feeling that they were safe in the hands of the Local Committee and their Manager.

Mr. W. H. Le Feuvre seconded the motion, remarking that there was a great future for Japanese coal, which was of excellent quality.

The motion was carried unanimously.

Mr. Rice moved a vote of thanks to the Chairman and Directors, which was unanimously agreed to.

Mr. Alfred Williams proposed, and Mr. Foreman seconded, a vote of thanks to the Secretary, which was also unanimously agreed to.

Mr. R. King, in reply, said he hoped his services would continue to give satisfaction to the Shareholders.

The proceedings then terminated.

BELFAST CORPORATION GAS SUPPLY.

The Monthly Meeting of the Belfast Town Council was held on Friday, the 1st inst.—the Mayor (Mr. J. Browne, J.P.) presiding—when a report from the Gas Committee was presented, of which the following is an extract:—

The Committee are of opinion that the £60,000 now standing at the credit of the renewal and contingency fund, and £22,500 7s. 5d. out of the surplus profits of last year, should be appropriated to discharge the premium paid to the Gas Company on the acquisition of the works, and they recommend the Council to authorize this to be done. The premium so paid amounted to £186,550, leaving the prime cost, as appeared in the old Company's books, standing at £250,000. It being the desire of the Committee that eventually the works shall, by application from time to time of the surplus profits, stand in the books at their original cost and of additional works, excluding the premium paid to the Gas Company on the purchase, the Committee have directed notice to be given to all the holders of gas mortgages falling due at the 5th of April next, that unless they renew their loans for periods of three, five, seven, or ten years, at 4 per cent., they will be paid off. Holders of mortgages to the amount of £10,120 were noticed in April last that they would be paid off on the 5th of October, unless they would renew at 4 per cent. for terms of three, five, seven, or ten years. £15,950 of the said amount will be paid, the other mortgagees having agreed to renew, and the Committee recommend that cheques therefor be signed, and they have arranged for new loans to like amount.

The annual accounts of the gas department were also presented, the following being some of the figures shown:—

Capital Account.

The total receipts were £439,843 14s. 11d.—viz., loans on mortgage, £449,593 (as per last year's statement); less fourth instalment paid Bank of England, £11,000, and £4050 of sundry mortgages repaid, leaving £434,548; to which are added the amount borrowed during the year, £3050, and the perpetual annuities of £2245 14s. 11d.

The expenditure to June last year was			£492,303 4 3
The additional outlay during the past year was—			
Mains and service-pipes	£3,221 15 3		
Coal-shed, complete (except floor)	5,983 2 10		
Engines and exhausters, valves and connections for same, and alteration of buildings	3,458 11 0		
Coke storing and measuring machinery	4,001 7 2		
Condenser	2,960 1 0		
Purifiers, with all pipes and connections, valves, &c.	5,516 14 9		
Retort-benches	1,727 14 11		
Two station-meters, valves, and connections	1,306 2 10		
Large lamps, lamp-posts, and governors	549 4 8		
Miscellaneous	253 10 6		
Meters	1,062 13 2		
		30,040 18 1	
		£522,344 2 4	
Less amount appropriated out of surplus profits (previously standing at credit of renewal and contingency fund) to discharge of premium paid to Gas Company on the acquisition of the works	£60,000 0 0		
Also amount appropriated out of the surplus profits of year ending June 30, 1880	22,500 7 5		
		82,500 7 5	
Total			£439,843 14 11

Revenue Account.

Receipts.

Sales of gas*	£77,334 16 9		
Less discounts	£4660 16 8		
,, bad debts	447 9 5		
	5,108 6 1		
		£72,226 10 8	
Public lighting and under agreements		10,121 16 1	
Residual products—			
Coke and breeze, less labour, &c.	£15,385 11 2		
Tar	6,332 18 0		
Ammoniacal liquor	4,854 10 11		
		26,573 0 1	
Rents		75 6 3	
Gas-rents recovered (formerly written off as bad)		9 2 3	
		£109,005 15 4	

Expenditure.

Coals (52,934 tons) including dues, carriage, unloading, &c.	£35,794 18 0	
Purification and sundries (including labour, £624 8s. 10d.)	1,700 9 5	
Salaries of Engineer and Assistant	929 3 4	
Wages (carbonizing)	6,247 6 0	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	4,648 4 1	
Coal used for steam-boilers	211 16 3	
Distribution of gas—		
Salaries of Chief Inspector, Inspectors, and Clerks	954 3 4	
Repair, maintenance, and renewal of mains and service pipes, including materials, laying and paving, and labour	1,038 11 8	
Repairing, renewing, and refixing meters	3,482 15 8	
Public lamps—lighting and repairs	2,433 5 7	
Rents	135 0 0	
Rates and taxes	2,870 9 3	
Salaries of Cashier, Accountant, and Clerks, Office-Keepers, &c.	1,700 12 6	
Salaries of Collectors	823 6 8	
Stationery and printing	178 3 9	
General establishment charges and incidental expenses	383 6 4	
Audit-fund	42 0 0	
Law charges	10 18 0	
	£63,614 9 10	
Balance carried to net revenue account	45,391 5 6	
	£109,005 15 4	

* Gas sold

	Cubic Feet.
Gas sold	498,059,000
,, used on works, &c.	4,500,000
,, unaccounted for	45,480,000
,, made	548,039,000

or 10,353 feet per ton of coal carbonized.

Profit and Loss (Net Revenue) Account.

The total of this account is £68,370 1s. 11d.; made up of balance from last year's account, £22,926 16s. 11d.; balance from revenue account, £45,391 5s. 6d.; and bankers interest, £51 19s. 6d. The above amount of £68,370 1s. 11d. is disposed of in the following way:—

Amount carried to renewal and contingency fund			£20,000 0 0
Interest on loans and annuities for the year ending June 30, 1880			19,599 8 1
Amount carried to sinking-fund			5,363 10 3
Amount carried to expenditure (see capital account)			22,500 7 5
Balance consisting of balance from last year's account	£22,926 16 11		
Less carried to renewal and contingency fund	20,000 0 0		
	£2,926 16 11		
Net profit on year's working	25,843 16 11		
	£28,770 13 10		
Less carried to sinking-fund	5,363 10 3		
	£23,407 3 7		
Less carried to expenditure	22,500 7 5		
		906 16 2	
Total			£68,370 1 11

Renewal and Contingency Fund Account.

To the balance of this account from the previous year (£40,000) there was added from the profit and loss account, shown above, £20,000; the total (£60,000) being carried to expenditure—see capital account.

Sinking-Fund Account.

This account stands as follows:—

Balance from last year's account	£15,075 16 11
Bankers interest	26 18 0
One year's interest on £15,075 16s. 11d., at 4½ per cent., less banker's interest as above	651 10 3
Amount brought from profit and loss account, viz.:—1 per cent. on amount borrowed, and 1-100th part of capitalized annuities	4,712 0 0
	£20,466 5 2

Of this amount, £15,102 14s. 11d. is carried to the extinguished loans account; £4225 of private mortgages, and £10,877 14s. 11d. to the Bank of England were repaid; leaving a balance of £5363 10s. 3d.

Balance-Sheet.

The debit side of this account was made up of the balances of the revenue, sinking-fund, and extinguished loans accounts; to which was added £14,381 15s. 11d. for sundry amounts due for interest accruing, new machinery, &c., including Treasurer (£7262 4s. 1d.); making a total of £35,754 17s. 3d.

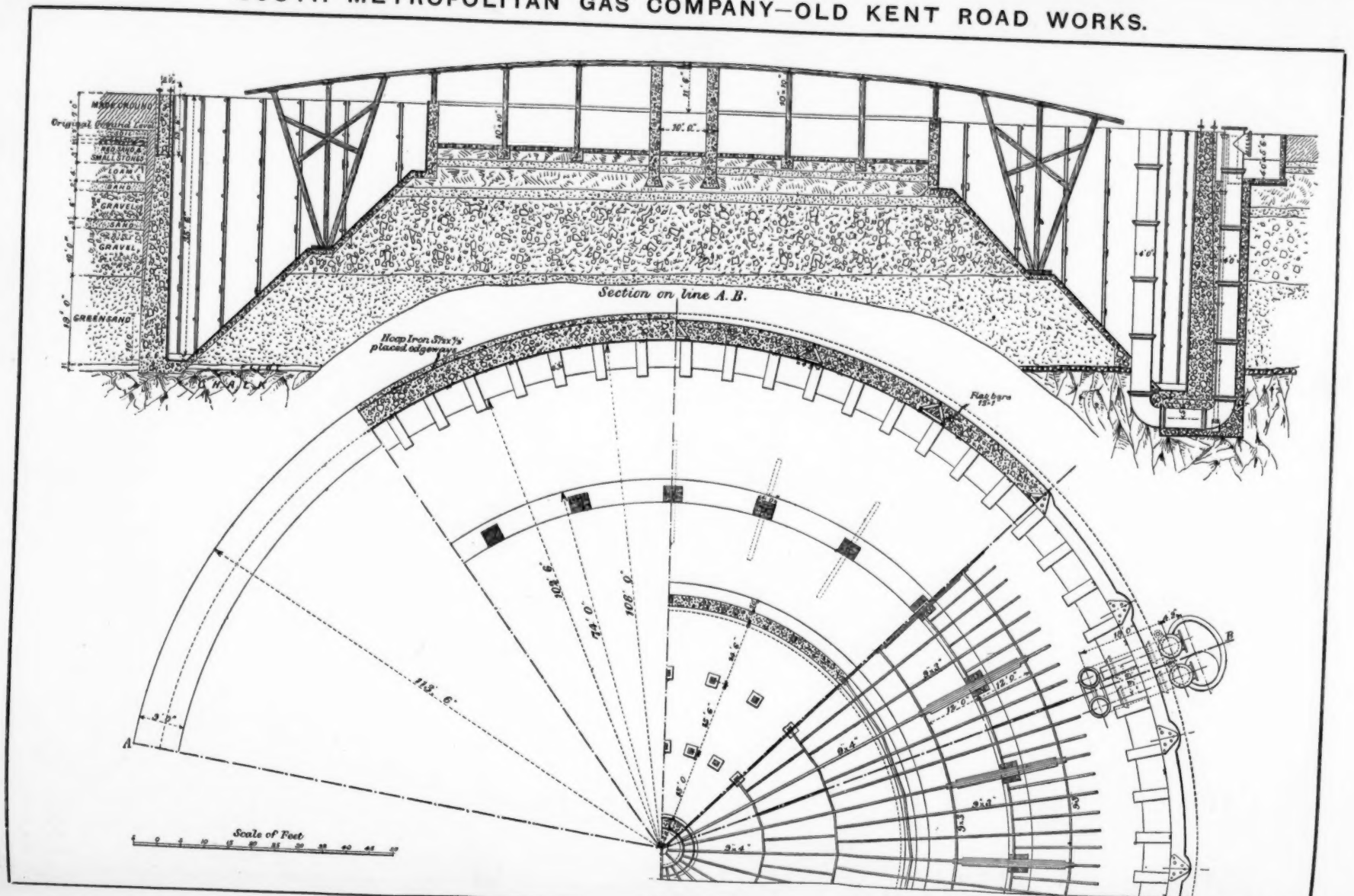
This was balanced by the following items:—

Cash at bankers (sinking-fund account)			£5,154 14 0
Value of stocks in hand—			
Coal	£4,306 5 0		
Coke and breeze	375 0 0		
Tar	220 0 0		
Ammoniacal liquor	30 0 0		
Sundry stores	4,742 11 0		
		9,673 16 0	
Accounts due for gas	£9,183 10 9		
Accounts due for meter-rent (arrears)	4 17 3		
Sundry accounts for coke, tar, &c.	3,739 19 7		
Sundry accounts for service-pipes	170 16 1		
		13,099 3 8	
Sundries—consisting of Council lamp account (£4945 7s. 4d.), Harbour lamp account (£424 10s. 4d.), &c.		6,092 3 7	
Half year's taxes unexpired carried forward		1,735 0 0	
		£35,754 17 3	

Sir John Savage, in moving the adoption of the Gas Committee's report, said: Mr. Mayor, it is with a feeling of high gratification that I rise to move the adoption of the very important report now presented, and to make a few brief remarks, on the present position and future prospects of this gigantic undertaking, arising out of the last year's accounts, now in the hands of the Corporation. The quantity of gas manufactured shows an increase of nearly 7 per cent., the figures being—for 1879, 513,970,000 feet, against 548,039,000 for the past year; and the loss in its distribution amounting to 8·29 per cent., against 7·49 in the preceding year. This difference, the Engineer (Mr. J. Stelfox) thinks, is accounted for by the fact that the gas was sent out at a slightly higher temperature than in the year preceding; and he is fortified in this view by the circumstance that the actual quantity sold per ton of coal carbonized was as high one year as the other, whereas the registered make shows an increase of 143 cubic feet on 1879. It will be seen, Mr. Mayor, that, though the price of gas was reduced 3d. per 1000 feet, entailing a loss of £6000, our profits are only £1472 7s. less than the year before; the amount for 1879 being £27,316 3s. 11d., against £25,843 16s. 11d. This favourable result induced the Committee to recommend a still further reduction of 2d. per 1000 feet, thus bringing the price down to 3s. 4d. without meter-rent, against 4s. 6d. with meter-rent, at which it stood in 1874, and which is exactly 30 per cent. reduction since the works came into our hands. In my judgment these figures prove very conclusively the ability and the prudence with which this local industry has been managed; and that even corporations, when they set themselves properly to work, are capable of rendering great service to their fellow-citizens. The total profits since the works came into the hands of the Corporation are £83,407 3s. 7d., and a sinking-fund of £20,466 5s. 2d.; or, in all, £103,873 8s. 9d. It will be seen that the expenditure on the works has been very heavy during the past year, amounting to the large sum of £30,040 18s. 1d. But this was only carrying out a portion of the expenditure detailed in my statement of March 13, 1879, amounting to nearly £100,000, to complete and thoroughly equip the works for their utmost capacity of 800 million feet per annum. The largest sum in that statement was for the new gasholder, which, it is expected, will cost in round numbers £40,000. In addition to this, there are still two sets of purifiers to be erected, costing £4000, and two additional scrubbers, £2000, which, with additional mains, will bring up the entire expenditure on capital account to fully £580,000. Now one of the most important items in this report is the fact that, after long and mature deliberation, the Committee came to the conclusion that it would be a wise and prudent policy to pay off, as occasion served and as soon as possible, the sum which the Council paid to acquire the gas-works—namely, £186,550. When the Corporation purchased them they stood as good *bonâ fide* value for £250,000; but the above enormous premium had to be paid in order to their acquisition. No wonder Lord Redesdale exclaimed that we had a salt pennyworth, and doubted if the works would ever pay. Well, they have paid, and will yet pay a larger sum, if prudently and wisely managed. The Committee decided that the surplus profits, independent of £82,500 7s. 5d., should be so applied, and the balance of £907 carried to next year's account. This served the double purpose of squaring off the expenditure to the 1st of July to a point, and of reducing our liabilities to a little less than £440,000. And inasmuch as we have still unexercised borrowing powers to the extent of £40,000, we have sufficient ways and means to pay for the holder without going for further

CONCRETE TANK (AS ORIGINALLY DESIGNED), 210 FEET BY 55 FEET.

SOUTH METROPOLITAN GAS COMPANY—OLD KENT ROAD WORKS.



CONCRETE TANK (AS ORIGINALLY DESIGNED), 216 FEET BY 55 FEET.

George Livesey, M.Inst.C.E., Engineer.

borrowing powers, which, in other circumstances, we would most assuredly have had to do. Reverting to the expenditure for the past year, I may remark that one of the most important items is the new coal-shed, which is quite a sight to see, and is capable of storing 20,000 tons of coal. It is thoroughly permeated with a network of rails, and enables the coal to be delivered into the shed with little or no manual labour. Of course, it is impossible to bind our successors, but I would strongly urge the propriety of continuing to allocate the surplus profits until the remaining £100,000 of premium is entirely wiped out, leaving the works, in four or five years, say, to stand at some £360,000, with a capability of producing 800 million feet of gas per annum, and, other things being equal, ensuring a profit year by year of from £40,000 to £50,000. This would be a proud position to occupy, and is certainly now within view of being consummated. Mr. Mayor, the accounts placed in the hands of the Corporation this morning exhibit in a concise manner the state of the gas interest at the present moment, and this completes the sixth year since they came into the hands of the Corporation. I really must congratulate the Council on the proud position in which they stand. The works, as you are aware, are in the best condition, with the most improved machinery. [In concluding his speech, Sir John Savage said it would be borne in mind that this time twelve months ago, when he had the honour of addressing them, he asked permission of the Council to retire from the chairmanship of the Gas Committee. They kindly asked him to continue during the remainder of the year. He had not only done so, but he had occupied the position, however unworthily, up to the present time; but he felt it had now come to this with him, that he must conclusively and definitively retire from the chairmanship of the Committee, not that he did not find the greatest possible pleasure in attending to the interests of the Committee, but he felt that the "shades of evening" were thickening round him, and for his health it became absolutely necessary that he should retire.]

Mr. CORBETT seconded the motion for the adoption of the report. He said he hoped Sir John Savage would reconsider the question of resigning the chairmanship of the Gas Committee. There would be a great many things to deal with during next year, and he did not see how they could do without Sir John's guidance.

Mr. M'GEAGH said he had heard many reports from the Gas Committee, but he never heard one that concurred so much with his views as the one now submitted. He never could feel there were any profits made so long as the debt on the gas-works was increasing; but he found now, owing to the change in the mind of the Committee, that they were reducing the debt, and this was a right and proper course. As regarded the remarks made by Sir John Savage about ceasing to be Chairman of the Committee, when he mentioned his intention nearly a year ago, he (Mr. M'Geagh) sympathized with his views, because he was in bad health; but Sir John, he was happy to say, was now in vigorous health, and so long as Providence continued him in it he did not think he should cease to give his valuable assistance to the town. He had certainly done great service, and he did not think for a moment the Council would entertain the idea of receiving his resignation. Sir John had some four years to remain in the Council, and he did not think that during those four years he ought to bring this subject before the Council again. He would not be in the least surprised if, under the care of Sir John Savage, they should bring the price of gas down to 2s. per 1000 feet, and if he did they would give him a handsome testimonial.

Mr. T. H. BROWNE said he was still in hope that they would have a large covered market built. It was proposed now to take £82,500 of the gas profits of other years to wipe off the charge on premium paid to the old Gas Company. He was quite willing that part of the amount should go to this purpose—say £50,000—and the remainder be spent on other matters, say the erection of a covered market, and to keep down the taxation of the town. They should also retain a portion of the money in hand. He was sure they would all regret if Sir John Savage retired from the chairmanship of the Committee—an office which he had so worthily filled, Sir John having brought the gas-works to such a successful issue; and now that his health was almost restored, he hoped he would see his way to remain Chairman. Not only did he, but the Gas Committee, deserve the best thanks of the Council for their efforts.

The MAYOR said he much regretted to hear the statement that Sir John Savage wished to retire from the chairmanship of the Gas Committee. Sir John had been the principal mover in the whole affair, and he had taken the greatest trouble, time, and labour to bring the gas-works to their present state of efficiency. Just now they were laying out a great deal of money, and if they should lose his (Sir John's) services the town would meet a loss. No one in the Corporation could expect that he would devote as much time to their interests in the future as in the past; but they would ask him to retain nominally the chairmanship of the Gas Committee; his advice and assistance would be so valuable to the Corporation. He thought if they would ask Sir John to do this, it was as much as they could expect. With regard to the remarks of Mr. Browne, the matter, he might say, had been discussed again and again in the Committee, and they came to what he (the Mayor) thought a wise resolution—to take £80,000 and pay off some of the old debt.

Sir JOHN SAVAGE said he might say, in response to the kind remarks made concerning his retention of the chairmanship, very few could know the strain on the mental powers the duties imposed; but if an efficient Vice-Chairman were appointed he might accede to the request so kindly put to him.

The MAYOR said that he thought he spoke the mind of the Council when he said they acceded to Sir John Savage's request. He thought it was proper that there should be a Deputy-Chairman in connection with such a large undertaking. He felt much pleased at Sir John Savage meeting the Council so fairly, and consenting for the future to give them a portion of his valuable time.

The motion was then put and carried, and the report adopted.

THE DISPOSAL OF THE SEWAGE OF GLASGOW.—In the course of the report, just published, of the deputation appointed by the Glasgow Town Council, to inquire into the treatment of sewage in various towns in England, the following passage occurs:—"It is scarcely within the terms of our remit to recommend a definite scheme for the disposal of the sewage of Glasgow, but we may state our views so far as to indicate in a general way what we consider the best course of procedure. We are of opinion that the sewage of the north and south sides of the river should be treated separately—that on the north being taken to Dalmuir by a high-level and a low-level sewer; while that on the south, the whole of which will require to be pumped, should be taken as far down the river as practicable. We are decidedly favourable to the intermittent system of precipitation as distinguished from the constant-flow process; but we leave the nature of the precipitant to be employed for future consideration, as the same construction of tanks and other apparatus is required for all the various systems. Of course, we expect that all the towns around Glasgow will also be compelled to defœcate their sewage; for it would obviously be absurd for this city to erect sewage works at an enormous cost, if other towns were permitted to introduce their filth without being cleansed."

MANCHESTER CORPORATION GAS SUPPLY.

At the Meeting of the Manchester City Council on Wednesday last—the MAYOR (Alderman Patteson) in the chair,

Alderman LAMB moved the adoption of the annual report and accounts of the Gas Committee, as given in the JOURNAL for the 12th inst. (*ante*, p. 573). In doing so he said he was sure the Council would be pleased to find the Committee were able to present such a good balance-sheet, especially after the trying year though which they had just passed. Although the number of consumers had been 1000 less than in the previous year, the gross profits for the twelve months were £111,000 against £96,000 last year. The extra fund had enabled the Committee to meet all their engagements, including the street lighting. The Council would see that those engagements were not mere bagatelles. They comprised £52,000 for improvements in the city, £39,000 for the sinking-fund, £27,000 for depreciation, and £25,000 for interest. He had stated that the number of consumers had shown a falling off during the past year, but at the same time the amount of gas consumed had been the greatest on record. There had been 240,000 tons of cannel and coal carbonized, against 232,000 tons last year. Reference had recently been made in the newspapers to the quality and price of the gas supplied in Manchester and Salford, and the question had been asked why they could not in Manchester make gas as cheaply as was done at Leeds. His answer to this question was that they could, if the gas consumers would only be content and not grumble if the Committee supplied them with a similar article to that supplied in the Yorkshire borough. It was well known that some companies were boasting that they could make gas without any cannel. It was not his place to find fault with them, if consumers were satisfied. He was very sorry to make comparisons, but the Committee were obliged to do it in self-defence. He maintained that the gas produced in Manchester was second to none. While he was anxious to reduce the price as far as possible, he hoped the Council would never allow the 10 per cent. to the Improvement Committee to be interfered with. Every improvement that had been made had increased the assessment of the city, and had given great facilities to trade and commerce. He moved, pursuant to the recommendations contained in the report, that on the 25th of December next the price of gas be reduced as follows:—Within the city, from 3s. to 2s. 10d. per 1000 feet; outside the city, from 3s. 6d. to 3s. 4d. per 1000 feet; beyond the River Mersey, and district of New Moston, from 4s. to 3s. 10d. per 1000 feet; and the price charged for gas supplied to the public lamps beyond the city be reduced 2s. per lamp per annum.

Mr. HARWOOD seconded the motion, and it was agreed to.

THE WATER SUPPLY OF DUBLIN.

At a Special Meeting of the Dublin Municipal Council, which was held on Monday, the 18th inst.—the LORD MAYOR in the chair—a report of the Water-Works Committee, on the subject of carrying out an extension of the Dublin Water Supply to Rathfarnham, was presented. It stated that the Committee had had under consideration for some time past numerous applications to extend the Vartry water system to Dundrum, Rathfarnham, Milltown, and other places in the vicinity, and having directed the Engineer to prepare plans and estimates of the probable cost of laying the necessary mains, and the income which would be derivable from supplies of water to the inhabitants along the line of pipes, he submitted a report on the subject, which stated, amongst other things, that he strongly recommended the work be immediately undertaken. He had made two estimates, the first being for the supply of the districts mentioned from the existing lines of mains, and the amount required to be expended would, he said, be £4800. This would afford a good and efficient supply of water. The second estimate was for laying a 15-inch pipe from the Stillorgan reservoir to Dundrum, a distance of about 5734 yards, and to take branches off this to supply the adjacent districts. This main would enable the Corporation to supply the Rathmines township as well. Such a system of pipes would cost £10,500, and he strongly recommended it to be carried out. The Committee further reported that they concurred in the report of the Engineer, and recommended the Council to sanction the extension of the water system direct from the Stillorgan reservoir.

A further report of the Water-Works Committee, in reference to the filtration of the Vartry water, came up for confirmation. The Committee stated that their attention having been directed to some observations of the Royal Sanitary Commissioners with regard to the filtration of the Vartry water, they had obtained the following report from Mr. Parke Neville, C.E., the City Engineer:—

Gentlemen,—I have to report with regard to the remarks made in the Report of the Royal Sanitary Commissioners, Dublin, recommending the more perfect filtration of the Vartry water, that I will have every precaution taken to render the filtration as perfect as possible. I have studied, for a long period of years, the construction of water-works, and every improvement that could be thought of by engineers was adopted by direction of the late Sir John Gray, to make the Vartry works, including the filters, perfect; and I may add that I have visited most of the large water-works in the United Kingdom, and know of none superior to the Corporation works.

At Glasgow, where the water is taken from Loch Katrine, and is more coloured than the Vartry (the gathering-grounds being chiefly covered with peat soil on the mountain sides), the water is not filtered, but simply passed through copper gauze wire screens at the Mulcahies service reservoir, the same as we do at the Stillorgan reservoirs. At Manchester I think there is no filtration; while at the Rivington works, Liverpool, the water is passed through sand filters like yours. Until the three new filters were constructed (now in use some 18 months), we were rather short in filtering area, owing to the consumption of water being larger than contemplated when the works were designed; but now we can pass the water through more slowly, which secures better filtration; but no filtration through sand will remove all colour from water collected from gathering-grounds such as the Vartry, Loch Katrine, &c., although the water is soft and perfectly pure; but, as I have before stated, I will have every precaution taken to secure the greatest purity of the water by frequent cleansing of the filters, and changing the sand more frequently, which we have now greater facilities for doing, having our own sand-pits, where large quantities of first-class material can be got.

With regard to the introduction of water into tenement houses, I have to report that the majority of this class of houses have the Vartry water brought into the yards; and as to bringing water up through such houses (as at present constructed and managed) so as to have a tap on each floor, I look upon it as impracticable, and if attempted would prove a greater nuisance than a benefit. No real improvement as to the water supply to tenement houses or others of that class can safely be attempted until the houses and yards are properly drained, flagged, &c., with proper privy and ash-pit accommodation, accompanied by a complete system of domestic scavenging carried out by the Corporation. I look upon all those appliances for the comfort and health of the populations living in the poorer parts of the city as being, I may say, linked together. First provide good main sewerage, which has been done, perfect drainage, and flag the yards; and then it will be possible to introduce more abundantly into the houses domestic water supplies.

I may conclude by saying that every means will be taken by the officers of the water-works department to improve such supplies as are under consideration, when opportunities occur.

On the motion of Alderman CAMPBELL, the reports were adopted.

THE BIRMINGHAM GAS-WORKS ARBITRATION AWARD.—At the meeting of the Oldbury Local Board on Friday, the 15th inst.—Mr. B. T. Sadler in the chair—the Clerk produced a copy of the award for Oldbury in the Birmingham gas arbitration, which set forth that the amount payable by the Oldbury Local Board, in respect of the works within their district, was £22,750. The Clerk pointed out that the Birmingham Corporation had been ordered to pay the costs of the application for extension of time.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

The Seventeenth Half-Yearly Meeting of this Association was held at Port-Glasgow, on Friday, the 1st inst.—Mr. R. S. CARLOW, the President, in the chair.

The SECRETARY (Mr. J. Johnstone, of Hamilton) read the minutes of the last meeting of the Association at Bridge of Allan, as well as of a number of Committee meetings held since that date; and, these having been confirmed, the following were admitted members of the Association:—Mr. Alex. Ross, Gas Manager, Burntisland; and Mr. Alex. Waddell, Kirkfieldbank.

The following is the

PRESIDENT'S ADDRESS.

Gentlemen,—At the outset of the very brief address which I mean to deliver on this occasion, you will permit me to return my sincere thanks for the distinguished honour you have conferred upon me by electing me to the presidential chair. I can assure you that I appreciate in the highest degree the feeling which induced you to place me in this proud position, and I am at the same time fully sensible of the further compliment of meeting in the town which is the scene of my daily labour. I am afraid that the town itself does not present to the outsider any of those very striking physical, romantic, or historical characteristics which obtain in many of the other towns of Scotland, and from a gas manager's point of view, I do not think the gas-works will be sufficient compensation for the absence of such attractions. But such as the works are—and they are highly creditable to the Corporation of Port-Glasgow—it shall be my pleasant duty at a later stage of the proceedings to show them to you. At one time in the history of the town of Port-Glasgow it gave fair promise to be a place of exceeding importance. It was, as you are all aware, meant to be the port for Glasgow, before engineers devised the great scheme of deepening the River Clyde, and it was selected by that city after the towns of Dumbarton and Troon had refused the shipping facilities which it demanded; but as the channel of the Clyde was widened and deepened the prospects of this town became dimmer and dimmer, at least so far as it was to be a dependency on its larger neighbour. Its civic rulers, both in the past and in the present, however, have done much to foster trade; and although dwarfed east and west by Glasgow and Greenock, it holds its own with wonderful pertinacity. It was here that the late Mr. Wood, the eminent shipbuilder, built and launched the first steamer which plied upon the Clyde—namely, the *Comet*—and since then some of the finest ships of the merchant navy which now crowd upon every sea have been launched from the port, and still the hammer of the busy riveter resounds from morning till evening, and tells of the construction of vessels which are to add still further to the fame of the Clyde shipbuilders. To this town, then, which is largely dependent upon the shipbuilding trade, I heartily welcome every member of the Association, and I trust that these few historical sentences may not be without interest to you all.

But the history with which we have all, as gas managers, to deal is one not of trade, or commerce, or politics. True, the industry with which we are all connected is closely allied to trade and commerce. With the fluctuations of these departments our business increases or decreases, and these, in their turn, influence the profits earned by companies and corporations. But while this association of interests is plainly apparent, we alone have to deal with gas manufacture; and here the chief aim of every manager, whether he be a member of the Association or not, ought to be to produce gas at the lowest possible price, consistent with giving a pure article and of a high illuminating power. It is not the part of a comparatively young manager such as I am to stand here and give advice to those "fathers" in the profession who have, by industry, perseverance, and scientific knowledge, secured for themselves the applause of their brethren and the respect and esteem of the communities in which they labour and live. I am delighted to see so many of these gentlemen present, and I trust that before the end of the day they will, by their discussion of the various items on the programme, not only contribute to the success of the gathering, but add to the store of knowledge of the younger men. It is for this purpose that we meet, and I fervently hope that the gathering in Port-Glasgow will not be without its reward.

In these days, when the spirit of competition is abroad, there is more than ever a loud cry for economy in the methods of production, and the manufacture of gas is by no means an exception to this general rule. Nor has the cry been unattended to. The past few years have seen the introduction of improved machinery and improved apparatus into our works, with the special object in view of minimizing or entirely superseding hand labour, of separating from the coal distilled the greatest amount of hydrocarbons, and of extracting more carefully than ever those valuable compounds which in the past were allowed, if not entirely to run to waste, to pass away in large quantities to the gasholder. Some of these appliances have very properly been consigned to oblivion, but others have come into practical use.

It has often been said that the place where the exercise of economy can have most effect is in the retort-house; and there is much force in the statement. From the moment the coal enters the works until the distillation is completed, there are many points where men, if not properly watched, would make such blunders, either through carelessness or ignorance, as would seriously swell the expense of gas production; and I would therefore lay it down as the foundation for after good results, that there should be ample store-house accommodation for coals, and that the house should be so planned that the coals shall be within easy reach of the stoker. I think also that less attention has been paid in the past to the arrangements of furnaces and retorts than the importance of the subject demands. Those members who have at all studied the literature of the profession are well aware that great difference of opinion exists as to which setting of retorts is best, whether we consider the convenience of the stoker or the yield per mouthpiece. Some gentlemen prefer settings of three retorts heated by one furnace; some five retorts heated by two furnaces; while yet again it has recently been claimed that with one furnace and four retorts, arranged as they are at Dumbarton, as large a yield of gas is obtained as by any of the other modes, and at a less expenditure of labour and material. I cannot say that I am at all prejudiced against such ovens of retorts as require two furnaces to obtain the requisite heat; but reason whispers that if the coal can be thoroughly distilled in the four retorts heated by one furnace, that is the setting which ought to commend itself to the members of the profession. I may state that in our works at Port-Glasgow we have ovens containing three retorts in each, heated by one furnace, and I find that the ovens so constructed give a most satisfactory result, and that the yield of gas per ton, or the yield per mouthpiece, is about as good as could be looked for under any circumstances. I have wrought with ovens containing three, five, and seven retorts, and, as I have just stated, I find that ovens built as we have them here have given the best results.

Taking it for granted that the very best setting of retorts has been introduced, there are elements which go far towards either increasing or decreasing the cost of the gas. For instance, a clumsy or indolent workman may so charge the retorts that a large quantity of the valuable distillate may pass away through the ventilators on the roof of the retort-house, or the heats may be allowed to get so low that the gases are not thoroughly removed from the amorphous mass in the retorts. In order to facilitate charging, two or three machines have recently been brought before the profession; but, so far as I am in a position to judge, none of them seem at all well fitted for the task. The mechanism which appears to have attracted the greatest amount of attention, and the latest appliance, I think, which has been brought under the notice of gas managers, is that invented by Mr. W. J. Warner, of South Shields, whose ability in another branch of mechanics, as applied to the measurement of gas, has won for him a high place in the fraternity of gas managers. I have not had the pleasure of seeing that machine working, but I have consulted the drawings of it, and I have had conversations on the subject with a gentleman who went to Jarrow specially to see the plan in operation, and the conclusion at which I have arrived is that machinery of much simpler construction must be invented before it can become an efficient substitute for hand labour. For the Warner charger and drawer the retort-house must be specially constructed; and even admitting that it saves manual labour—a proposition which I am not disposed to admit—the expenses of making new erections and introducing costly machinery would be more than existing companies or corporations would be inclined to sanction. With the number of men who are employed controlling the machine, attending to the actuating motors, and hoisting and carrying out the char, I am convinced that the retorts could be charged in an equally short time as the machine takes to do the work, and there is therefore just so much less capital to pay for out of the profits arising from the manufacture of gas.

While I say this, I do not despair of the arrival of the days when mechanical stokers will displace hand labour, and the sooner the better, for the stoker's occupation is a slavish one. I do not forget that inventions meant to supplant the labourer or mechanic were not perfected in a day. History teaches us that years of patient study and observation must intervene between the original design and the ultimately perfect machine. We have not far to go for an example. On the other side of the Clyde, and under the shadows of Dumbarton rocks, one may see any day the first marine engine made by Napier, and if he takes the trouble to compare it with the enormous and highly finished engines which are now supplied to steam vessels, he will see at a glance that the science of mechanics has made rapid and wonderful progress within the past 40 years. I do not think we shall require to wait so long for the perfection of the mechanical stoker; but of this I am sure, that unless the machinery is simple, easily handled, and capable of being applied to any setting of retorts, the day will be far distant when mechanical stokers will meet with general approbation.

There are, however, other reasons why gas should be economically produced besides those I have mentioned. Gas does not stand alone in the field of artificial lighting. It has now many competitors, from the powerful electric light down to the halfpenny dip; and it is amongst the lower class of competitors, rather than among the higher, that it has anything to fear. Paraffin, in my opinion, is by far a more dangerous rival than electricity. It is produced at a cheap rate; a lamp in which to consume the oil can be had for a mere bagatelle; and the light which it affords is by no means insignificant, or to be despised. Then it has this further advantage, that in burning oil the consumer does not require to leave a deposit of money with any one; and this alone, in the eyes of many short-sighted people, is a high recommendation in its favour. While paraffin has these advantages, you have to put on the other side its disadvantages. The filling of the reservoirs with oil is attended with a nasty odour; the material of which the upper part of the lamp is constructed is often brittle and easily broken; and the slightest carelessness on the part of a child or menial might lead to disastrous results in the way of fire. So much for paraffin.

Now permit me to draw your attention for a minute or two longer to the subject of electricity, which at present occupies so much of public attention. After watching the various phases of this question within the past two years—for that really is the period since it came to be regarded as a formidable rival of gas in the domain of public and domestic lighting—I am forced to the conclusion that if ever gas is compelled to play "second fiddle," it will not be to electricity. At this time of day it is useless to indulge in idle regrets that the scare caused by the announcement of Mr. Edison's discovery should have been productive of so much damage to gas stocks; but if that scare caused the unwary and nervous to smart, it had a beneficial influence upon the manufacture of gas, and its proper distribution and consumption. Inventors endeavoured to devise means whereby gas could be better and more economically consumed, and the result has been a decided victory in favour of gas. Unquestionably, if the desire is to illuminate a large space, and if an unsteady light and the greater expense of production do not form important factors in the calculation, electricity is a useful illuminant, but in no other circumstances. Hitherto it has been found impossible so to divide electricity as to produce, in our rooms and in our workshops, a multiplication of small lights, and it has been found equally difficult to store the subtle fluid in such quantities as to be of any practical value. While for the purpose of making a show, or, as in some instances, when it is used where careful discrimination of colour is necessary, electricity may be adopted, yet in the extensive field of domestic lighting gas stands unrivalled.

Within the period during which the electric light was all the rage, gas engineers have not been idle. Improved burners, combinations of already well-known burners, and particular and patented modes of placing them, have shown to the public that if a strong flood of light is really requisite for a courtyard, a hall, or an important crossing, it can at once be easily obtained by the use of gas. Therefore, so far from electricity having done any harm to the manufacture of gas, it has resulted in good. It has given an impetus to all concerned in its production, and I make bold to say that the public have within the past two years learned more of the good qualities and useful purposes to which gas can be turned, than almost since the day of its first introduction. The scare is now numbered among the things that were, but I hope that those interested in the promotion of gas interests will not "lie idly on their oars," and wait again for a fresh "stirring of the pool." Our cry should be "Excelsior." Let us utilize gas to the utmost extent, and in the most approved way; and then should the day ever come again when the cry is raised of "Wolf! wolf!" the public will be better able to estimate it at its true value.

This leads me on to say a few words upon the question of encouraging the more extensive use of gas at the domestic hearth. Most of you are aware that gas-works are not always employed up to their full strength. At certain seasons, no doubt, there is a heavy drain upon the resources of all works; but during the summer-time, and often during the prevalence of daylight, the full complement of retorts is not in active use. Here, then, we have a serious loss, for capital unemployed always means decreased profits at the end of the financial year. I should like to see our Scotch gas companies and corporations emulate English towns, and encourage the day consumption of gas for the purposes of cooking and for producing motive power. The gas-cooking stove is but a thing of yesterday, and yet, in my opinion, it is destined to play an important part in connection with our manufacture. Gas companies, by offering inducements to people to introduce these clean and handy stoves, might in a

short time so augment the demand for supplies of gas, that all the retorts in the works could be kept in constant use in summer as well as in winter, in daylight as well as in darkness. Of course it would be for each to consider his own special conditions in offering inducements to consumers; but I should be inclined to suggest that stoves, like meters, should be let out on hire, with the option to the user to purchase right off or by making so many payments. Or, again, arrangements might be made with landlords of houses to introduce a suitable stove to every kitchen, so that tenants, in moving from one house to another, would not require to sever connections in order to remove the stoves. When once the public come to consider how cheaply, how cleanly, and how easily they can, by the use of gas stoves, cook their daily food, I am certain we shall hear fewer complaints about the non-employment of plant in our works. It might be a consideration for companies if they desired to stimulate the industry of gas-making, whether they should not allow a certain percentage of discount to all consumers who use gas both for cooking and lighting.

Then there is another consideration on this same topic. Through the perfection of the heating stove, gas may in the future be more largely run upon. Those who have been accustomed to the open fire are, no doubt, prejudiced in its favour, and this, too, although they are fully aware that one-half of the coal put upon the fire passes away without doing any good in the way of heating. The prejudice of these people must be respected, but at the same time it must be broken down, and the best way to do this is to encourage the introduction of gas-heating stoves. When the air in a room is raised to a comfortable temperature, and suitable ventilation provided for carrying away the air vitiated by breathing, we may expect not only greater comfort to the people, but more healthy houses. And in fostering and encouraging the introduction of such stoves, gas companies will not only be forwarding their own interests, but will materially contribute to the welfare of the communities amidst which they are placed.

There is another most important way in which the use of gas should be encouraged—I mean using it as a motive power. You will have seen that lately some most ingenious, simple, and useful gas-engines have been invented, and are now being brought under the notice of the public. Where only a small amount of power is required, I know of no motor that will answer the purpose so well as a good gas-engine. It can be applied to so many various purposes, such as driving printing presses and sewing machines, turning lathes, &c., and it can even be applied with great benefit and economy in some of our churches, for driving the organ bellows.

And now, gentlemen, you will see, from the few observations I have just made, that many and various are the ways in which gas can be used, and when the people come to use it, as shortly I am convinced they will use it, for other than domestic purposes, then we shall be enabled, on account of the larger consumption, to produce the article at a much cheaper rate than it has ever been done in the past.

I might, gentlemen, have said a little on some of the other matters connected with the manufacture of gas, such as condensing and scrubbing, purification, leakage, meters, &c.; but I have purposely refrained from doing so, as several of these subjects will be handled, and I have no doubt ably handled, by some of the members of the Association, at a later stage of the present proceedings; and from the discussions that will follow I hope much information will be obtained on these subjects.

I cannot close my remarks without a reference to the present position of our Association; and it gives me great pleasure indeed to be able to congratulate you on its prosperous condition. During the past six months no deaths have taken place amongst our number, and no calls whatever have been made upon our Benevolent Fund. This fund, I am glad to inform you, still remains untouched, and from information I have received from the Treasurer, I am also glad to be able to state that the managers or working fund is in a very healthy state. The General Committee have been most assiduous in their labours during the past half year, and to them we are indebted for the prosperous state in which our Association stands.

On the motion of Mr. Brown (New Cumnock), seconded by Mr. S. Dalziel (Kilmarnock), a vote of thanks was passed to the President for his address.

(To be continued.)

THE NOTTINGHAM CORPORATION SEWAGE FARM.

On Thursday, the 14th inst., a number of members of the Nottingham Town Council, with some of the chief officials, paid a visit, at the invitation of the Sewage Farm Committee, to the Corporation Sewage Farm at Stoke Bardolph, on the banks of the Trent. Among those present were the Mayor (Sir J. Oldknow), the Chairman of the Committee (Alderman Barber), the Town Clerk (Mr. S. G. Johnson), the Consulting Engineer to the Corporation (Mr. M. Ogle Tarbotton), the Medical Officer of Health (Dr. Seaton), and the Borough Engineer (Mr. Brown). The party left Nottingham by train shortly after eleven o'clock, and in the course of the outward journey the line of the great sewer, which lies close to the railway, was pointed out. On arriving at the Stoke Lane crossing the party alighted, and proceeded to inspect the farm, a few particulars respecting the history of which, and of the sewage works generally, will be interesting.

The general question of the disposal of the borough sewage, which it has been sought to solve in this farm, has been before the public and the Town Council for a period of over 20 years. In 1859, Mr. T. Hawksley, in conjunction with Mr. Tarbotton, was instructed to report upon the general principles of intercepting and outfall sewers—a work which was duly accomplished by them under the directions of the then Health Committee. Nothing more was done for some years, however, till the Corporation were compelled by the riparian owners to take some steps for the alleviation of the nuisance which was caused by the depositing of sewage in the River Trent. The subject came before successive committees of the Corporation, and ultimately the Acts of Parliament which dealt summarily with the question of the pollution of rivers were passed, the Council being thereby forced to take rapid and active measures to dispose of the town sewage otherwise than by allowing it to fall into the river.

In 1871 the matter was further pressed upon the attention of the Corporation by the riparian owners and also by the Local Government Board, which drove the Council to promote a united scheme with the outlying districts for not only public sewerage works, but to deal with the sewage of the locality generally. This led to the formation of the old Leen Valley District Sewerage Board, which was created under an Act of Parliament passed in 1872, and which united Nottingham in one body with the upper districts of the Leen Valley for the purpose of taking up the sewage question, and gave power to execute whatever works were necessary for a united system to deal with the sewage. The first act of the new Board was to complete the sewerage of the Leen Valley, which was done at a cost of about £50,000, the sewage being thereby intercepted throughout the whole of the valley of the Leen, from the north end of Bulwell to the south end of Nottingham, the sewage being cast into the river along with that of Nottingham. The next operation was to deal with the sewage so collected, and in 1875 Mr. Tarbotton, the Engineer to the Board, made a report in which he recommended that the whole of the sewage should be dealt with in altogether the modern mode—not by the obsolete forms of chemical or precipitation processes—and that it should be carried to productive land, whereby it might be purified, and whereby also certain agricultural results might be attained, so as to some extent to repay the cost of manipulation. The report was deliberated over by the Leen District Board at considerable length, and submitted to several engineers and agriculturists of eminence.

About this time the extension of the borough was determined upon, and in 1877 the functions of the Leen Sewerage Board were merged in the Nottingham Corporation, who undertook the completion of the works which had been designed and determined upon by their predecessors. These works consisted in the construction of a gravitation outfall sewer from Nottingham to the land selected by the late Board, and approved of subsequently by the Town Council, at Stoke Bardolph. The works are of a comparatively complicated engineering character, but generally are simple in their principle, and consist of an outfall sewer from Sneinton to Stoke. Into this outfall sewer the higher portions of the town deliver their sewage by simple gravitation, but the lower portions of the town will deliver their sewage into it by pumping, which will be carried out in the Eastcroft, dealing with the whole of the sewage brought down the Leen Valley from Bulwell and Nottingham. The sewage will therefore be brought partly by gravitation and partly by pumping into the main gravitation sewer, along which it will flow down to Stoke fields. A large outfall sewer has been constructed at a cost of £35,000, commencing at Sneinton and passing through the Colwick Hills by means of a tunnel two miles long at the eastern extremity, delivering its contents upon the land at Stoke. This land consists of 638 acres 22 perches of porous gravel soil, eminently calculated, chemically and mechanically, for the reception and purification of the whole of the sewage of the district. Since the completion of the sewer the land has been laid out on the most modern and scientific principles for the reception of the sewage. About five miles of main carriers have been constructed of a concrete in which the chief elements are Portland cement and gravel, and these will, when the works are completed, convey the sewage to the different portions of the farm. Subsidiary carriers will then distribute the sewage over the land for the cultivation of the various crops. About 350 acres have already been laid out for the reception of sewage, and at the present time all the sewage of the high-level districts of the borough is capable of being passed over and purified upon the land.

It has been found necessary to erect large and elaborate farm buildings for the purpose of the operations, which are, of course, in excess of those usually required by ordinary farmers. These buildings consist of stabling for about 60 horses, cattle sheds for about 80 cows, piggeries, barns, cart and implement sheds, a complete system of water supply and diffusion, workmen's offices, and all the various buildings attached to an extensive farm. These have been constructed, and are now in full operation. Mr. Avis is the Farm Manager and Bailiff, residing at the buildings, and from his experience in various parts of the country as a sewage farmer and as a practical agriculturist he is considered especially competent to undertake all the heavy and responsible work which will devolve upon him. He has already proved his capacity by the magnificent crops, particularly of potatoes and wheat, which have this year been produced, partly by sewage cultivation and partly in the ordinary manner. The farm is capable of receiving sewage from a population at least double that of Nottingham at the present time, and if the reports of the Royal Commissioners and the advice which has been given by the collective Sanitary Commissions during the last 20 years may be at all relied [upon, the sewage of the borough may be readily purified and appropriated for fertilizing purposes upon this farm for the next 70 or 80 years to come.

The cost of the works, it must be understood, should be separated from any of the operations which are common to the sewerage of the borough at large. The whole cost of the outfall works, including the preparation of the land at Stoke, its drainage, the farm buildings, levellings, the carriers, and the other works incident to and inseparable from the application of the sewage, up to the present time has not exceeded £70,000. It is probable that to complete what has been undertaken about £30,000 more will be required to be expended, making the total about £100,000, which was the exact amount of the original estimate laid before the Leen Valley District Sewerage Board and the Corporation by their Engineer. Apart from this, however, it must be expected that as the borough extends the outlay will be correspondingly increased. It is noteworthy that up to the present time no money has been spent in parliamentary or other litigation. The annual expenditure will necessarily vary in the seasons, and depend on local difficulties in respect of the sewage works, but it is hoped and believed that the annual loss to the borough will not exceed 2d. or 3d. in the pound; and when it is remembered that in towns like Birmingham, Leeds, and Blackburn, the ratepayers are paying 5d. or 6d. in the pound for the disposal of their sewage, it may be thought that Nottingham is comparatively fortunate.

Just beyond Stoke Lane the gravitation sewer ceases and becomes merged in the main carrier. Here Mr. Tarbotton took the party into his charge, and from point to point as they afterwards proceeded explained everything that was seen and that needed explanation. The drainage was one of these matters. This is carried on by means of drains sunk very much deeper than usual—6, 8, and even 10 feet deep. The natural formation of the farm, roughly speaking, is saddle-backed from south to north, as the valley trends at that place; and, in conformity with the natural principle of drainage, it has been thought proper to drain both towards the river and from it. This system existed, indeed, in the old days of shallow drainage, one dyke running along the north-west side of the farm, crossing the railway, and joining the Trent farther down the valley after re-crossing the river. A dyke of pretty much the same character ran along the other side of the farm, and also emptied itself into the main stream. The latter has not been altered materially, but the former has been deepened very considerably and provided with a concrete bed. Its course has also been changed, so that instead of crossing the railway twice, a way has been made for it along the side of the line to obviate the necessity for this. The minor details of the drainage have not been overlooked. The pipes employed are of the best manufacture, and far superior to those ordinarily used for agricultural purposes, they being intended to be as permanent as such things can be. The smaller drains do not run at right angles to the main drains, but herring-bone fashion in the direction of the flow of the water. The farm is not equally drained, however, the centre portion having pipes laid at a distance of only 44 yards, while the extremities of the farm are, or will be laid with pipes at double that distance. Mr. Tarbotton, in the course of the inspection, explained why the main carrier was so high out of the ground, being so placed at a much greater expense than would have been necessary had it been fixed at a lower level. It was that it might be able to dominate the whole of the farm, which varies considerably in its level, and which could not otherwise be supplied with sewage by filtration. The crops growing attracted a large amount of attention, and the greater portion of the time at disposal was spent in their examination.

After the tour had been completed, however, the party proceeded to the farm buildings, which were examined, the dairy exciting considerable interest. Here luncheon was served, and among the toasts proposed were those of "The Health of Alderman Barber," the Chairman of the Sewage

Farm Committee, and "The Health of Mr. Tarbotton," the Engineer to the Corporation.

Mr. TARBOTTON, in acknowledging the compliment paid to him, said he was very pleased indeed that the Council had honoured the works with a visit. He could only say that the works had been carried out to his personal satisfaction. They had before them an important work, for which there was an absolute necessity, and which had been spoken of all over the country. It was a work of sanitary advantage and improvement, and one which was imposed upon them, not by their own wishes, but by the law of the land. The undertaking had involved great anxiety on his part, and also on the part of those who helped him, and whose names he wished to acknowledge. He had to say that the works had been executed in a thoroughly proper manner, and also that he had great satisfaction in being able to state that he did not think, with the experience which he had had for many years, and with all the different views which had been expressed, that if he had the work to do again he should alter a single thing or do a single thing different from what had been done. He spoke very highly of the Farm Manager, and said of course the farm would never pay its expenses—it was not intended to do so. When the Council undertook it they were not making gas or selling water, or doing any of those things which they did from time to time, and which produced large profits. They had to deal with a nuisance, and to abolish it with the least expenditure of money.

The company shortly afterwards dispersed.

ON THE THERMAL POWER OF GAS HEATING APPARATUS.

By Mr. R. BRIGGS, C.E., of Philadelphia.

[From the *Journal of the Franklin Institute.*]

At the recent meeting of the British Association of Gas Managers a paper was presented by Mr. T. Travers, of Cork,* on the thermal effect of coal gas when employed in heating or cooking, from which the following is extracted. Mr. Travers gives the result of a number of tests made in "a plain, practical method, such as may be applied to the doings of every-day life;" that is, tests made without the attempt to obtain exact experimental results, but merely to exhibit the probable heat effect of coal gas for domestic purposes. His preliminary tests were upon the evaporating effect of coal gas of various qualities by means of an apparatus which we are left to suppose was similar to a gas-cooking stove, with no attempt to utilize the entire heat of the gases of combustion, which may be assumed to have been allowed to escape in the open air, in the usual way, without condensation of the vapour of water generated by the burning of the hydrogen of the coal gas. The apparatus employed for producing the coal gas "was capable of carbonizing 30 cwt. of coal per day," which may be set down as producing 15,000 cubic feet of gas in that time. He consequently had distinctive specimens of gas to test, and Scotch cannel, Newcastle and South Wales coal was experimented with, giving the following results:—

Coal.	Illuminating Power.	Water Evaporated.	Gas Consumed.
Cannel	24·0 candles	1 gallon	18·50 cubic feet.
,,	22·0 ,,	1 ,,	19·75 ,,
,,	20·0 ,,	1 ,,	20·50 ,,
Newcastle	16·5 ,,	1 ,,	21·75 ,,
,,	14·5 ,,	1 ,,	22·00 ,,
,,	13·5 ,,	1 ,,	22·50 ,,
South Wales.	10·5 ,,	1 ,,	28·00 ,,
Do. do. and 20 per cent. cannel	14·0 ,,	1 ,,	23·50 ,,

In the *Journal of the Franklin Institute* for April, 1878, will be found a paper by the collator of this article, computing the results of combustion of coal gas, wherein it was shown that the theoretic heat effect of coal gas of specific gravity ·426 was, closely, 622 units where the vapour of water formed in the combustion was permitted to escape uncondensed. [It may be added here that when the vapour is condensed to water at 70° Fahr., the total heat units from 100 lbs. of gas coal of the specific gravity of ·426 are 2,154,350 units, while those from 1 cubic foot of coal gas at 70° are 690 units, with close approximation.] It follows that about 0·7 of the total heat effect possible (at 622 units) was utilized by Mr. Travers's arrangement from Newcastle coal gas of ·420 specific gravity.

It will be noticed also that, with the same method of testing, the heat effect increased in some measure with the illuminating power. As the illuminating power increases or diminishes with the quantity of carbon present in "illuminants," and also as the specific gravity, this change can be attributed to the superior ultimate intensity of the carbon flame as compared with the hydrogen flame, an intensity nearly as 3 to 2 in favour of carbon (18,293° to 12,764°).

Besides these practical tests of different qualities of coal gas, Mr. Travers further instituted a comparison of results from such burners as are found in gas-stoves in general, using Newcastle gas coal of 16 candles, as a standard of average gas at present supplied, in all the tests.

	Thermal Units per Cubic Foot of Gas.
No. 1.—Cooking stove fitted with a Bunsen burner formed by a ring of 1¼-inch wrought-iron pipe with jet-holes 1 inch apart gave	244
No. 2.—Boiling stove, consisting of single burner 9 inches diameter, made of ¾-inch pipe, jets ¾-inch apart	260
No. 3.—Hotplate, consisting of three rings, each 6 inches diameter, jets ½-inch apart	280
No. 4.—Like the above, rings 4 inches diameter	310
No. 5.—Cooker formed of bars of 1-inch wrought-iron pipe, jets ½-inch apart	398
No. 6.—Concentric burner, consisting of a double row of rings one inside the other, 6 inches diameter	390
No. 7.—Burner, same construction as above, but 4 inches diameter	408
No. 8.—Solid flame burner	450
No. 9.—Wallace's burner adapted for domestic purposes	580

The Wallace burner here referred to is constructed so that gas-jets escape across an aperture like an atomizer, and the mixture of gas and air is more intimately effected than with the other burners.

It being almost certain that in all these instances the combustion was perfect, as the offensive nature of incompletely consumed gas is at once observable, it can be said, on the whole, these tests exhibit the improper control of air supply, or inadequate surface of the vessel receiving heat, or the incomplete contact with that surface, conditions within the province of the gas-stove makers to regulate, whence the best ultimate effect to be anticipated from gas stoves is from 0·7 to 0·8 of the theoretic effect—say from 435 to 500 units of heat per cubic foot of gas.

The ordinary economy of coal as fuel in a kitchen range may be taken at 5000 units, the remainder of the heat escaping up the chimney; whence a cubic foot of gas is of equal value to about 1-12th to 1-10th of a pound of coal. Unfortunately for the coal exhibit in this statement, not 1-10th of the heat given out in the range fire in any one day is expended in cooking, and it is only in the faculty of warming the room and for heating water that coal demonstrates its economy over coal gas as a fuel.

The foregoing assumption as to comparative value of coal and gas as fuel can be reduced to dollars and cents as follows:—

2240 lbs. of anthracite coal, at 5000 units = 11,200,000 units, present value 6 dols.

3000 cubic feet of gas, at 470 units = 1,410,000 units, present value 6 dols.

Ratio of heat value of anthracite coal to that of city coal gas = 7 to 1.

Mr. Travers further describes his experience with burning luminous flames in the production of heat, giving as an instance the case wherein a stove "from one of the best makers was placed in a low-lying district, and the day pressure was not sufficient, with the result that the Bunsen burner, which formed the heating ring of the stove, frequently fired back." "To increase the pressure was out of the question, and to meet the case, the flame was converted from a non-luminous to a luminous one, of course effectually avoiding the risk of firing back. The consumption of gas was not increased by the alteration, for much of the heat that was before lost by conversion is now converted into radiant heat. Bunsen burners, to be used for heat-giving in fire-places are [says Mr. Travers] to my mind, and for the reasons above given, a mistake; for, unless special arrangements are made, over 90 per cent. passes off in the shape of convected heat."

There exists a common misapprehension of the heat effect of burning a mixture of gas and air, which produces a non-luminous flame as compared with that from the burning of the stream of gas in the ordinary way of lighting. Either of these ways will clearly evolve an equal amount of heat from equal quantities of gas perfectly consumed. But the perfect combustion is ensured by the Bunsen arrangement at times and under conditions when it certainly would fail with the common burner. Where the flame of a simple gas-jet is brought in contact with any cold body, or cooled by radiation from any cold body near to it, it is likely to be extinguished and to create not only a smoke of unconsumed particles of carbon, but also produce a large proportion of partly burned carbon, or CO, in the gases of combustion. This last product will follow an inadequate supply of air to the gas. Thus a sheet of gas emerging from a horizontal surface of perforated plate or wire gauze will burn with a nearly non-luminous flame, and will emit a large proportion of carbonic oxide in the products of combustion. The heat expended in the production of light is quite inappreciable, as is established fully by the absorption of light generally with inappreciable evolution of heat, and it is seen that the reasons above stated show the only superiority of the Bunsen flame over the luminous one.

* See JOURNAL, Vol. XXXV., p. 949.

ON THE SOLUBILITY OF CARBON DISULPHIDE IN WATER.

By Mr. W. T. PAGE, of Norfolk, Va., U.S.A.

[One of the "Notes of Work by Students of Practical Chemistry in the Laboratory of the University of Virginia."

Communicated to the *Chemical News* by Professor J. W. Mallet.]

In most of the standard text-books of chemistry it is stated that carbon disulphide is "insoluble in water," "not sensibly soluble," or "nearly insoluble." It must have been often noticed that water shaken up with the sulphide acquires its odour, and hence some degree of solubility might have been inferred. The only attempt on record, so far as I know, to determine accurately to what extent solution really takes place, is that of Sestini, who found in a single experiment that 30 c.c. of CS_2, shaken up with 8·69 litres of water at 20° to 23° C., diminished by 11 c.c. in nine days, by 1·4 c.c. in the next three days (in diffuse light), and by 0·6 c.c. in five days more (in the absence of light). He states that a part of the sulphide was decomposed, and that the coefficient of decomposition was, in the light, 0·35, in darkness, 0·12, without giving any information as to how these determinations were made; and hence concludes that in this experiment 7·85 c.c. of CS_2 had been dissolved, or about 1 part in 1000 of water by weight. This should be, more accurately stated, 1 in 873.

Mr. Page employed pure water, deprived of air by long-continued boiling, and cooled down in a well-closed flask filled nearly up to the stopper from another like flask just before removal from the lamp. The stopper being removed for a few moments, recently purified carbon disulphide was introduced to the extent of two or three cubic centimètres (more than the water present could dissolve), the air was expelled from the very small remaining space by carbon disulphide vapour, the well-fitted stopper was inserted, and as a further precaution against any entrance of air, the stopper and upper part of the neck of the flask were surrounded by water or mercury. Each such vessel was shaken at short intervals from day to day. Some of the vessels were kept exposed to diffuse light; others were kept in the dark in a cellar. With the precautions mentioned, no evidence of decomposition of the sulphide was obtained. It was found that the solution could be oxidized with tolerable rapidity at common temperatures by quickly and accurately measuring off known volumes, adding to each an excess of potassium permanganate acidified with nitric acid, and keeping the whole in a well-stoppered bottle until the change was complete. The sulphuric acid formed was determined as barium sulphate. Calculating from the quantities of sulphur thus found, the following results were obtained:—

Time of Contact with Water.	Average Temperature (nearly constant).	Solubility of CS_2.
30 days	12° to 13° C.	0·203 in 100 by weight
Do.	Do.	0 198 ,, ,,
55 days	15° to 16°	0 191 ,, ,,
7 days	25° to 27°	0·168 ,, ,,
57 days	30° to 33°	0·146 ,, ,,
Do.	Do.	0·143 ,, ,,

It will be seen that the solubility diminishes with rise of temperature; but, so far as shown by these few determinations, this diminution does not occur at a rate equal to that at which the vapour-tension of CS_2 increases, as shown by the tables of Renault and Marx.

PURCHASE OF THE BRIDGNORTH GAS-WORKS BY THE TOWN COUNCIL.—On Saturday, the 16th inst., the Bridgnorth Gas Company agreed to part with their works to the Town Council, the terms of purchase being £10 per share. The amount to be paid by the Council will be £14,000.

SALE OF GAS AND WATER SHARES AT LEWES.—On Thursday, the 14th inst., Mr. H. E. T. Hickmott offered for sale by auction at Lewes a number of shares in local Gas and Water Companies. The first four lots consisted of £40 worth of original capital stock in the Lewes Gas Company, which sold for £72, £73, £74, and £74 respectively. Lots 5, 6, 7, and 8 were new £25 shares in the Lewes Water-Works Company, lot 5 selling for £30, lot 6 for £29, and lots 7 and 8 for £29 and £30 10s. respectively. Lots 9 and 10 were three original £10 shares in the Eastbourne Gas Company, which realized £55 and £54 10s. Lots 11, 12, 13, and 14 consisted of eight "B" shares of £10 each in the same Company, and were secured for £112, £109 10s., £110, and £109. Lots 15, 16, and 17 were three "B" shares of £10 each in the Company, and these were sold for £41, £40 10s., and £41 10s. respectively. There was a good attendance, and the bidding was very spirited.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Glasgow Exhibition of Lighting and Heating Appliances, &c., has become such a very pronounced success, that the Executive Committee, after meeting with the hearty co-operation of almost every one of the exhibitors, have resolved to keep it open for other five days, the closing day being Saturday, the 30th, instead of Monday, the 25th inst. During these additional days it has been mutually agreed between a Committee of the Exhibitors and the Executive Committee that the exhibition shall open at noon instead of ten o'clock a.m. The attendance of visitors during the past few days has been most gratifying. On Thursday, which was the Sacramental Fast Day in the Glasgow district, the exhibition was open the whole day long, which was quite contrary to the customs of the Scotch church-going people; but it was evident that the Committee had wisely resolved in reference to the opening on that day, inasmuch as the number of visitors who passed the turnstile was by far the largest that had then been recorded, amounting to no fewer than 1842, in addition to holders of season tickets, exhibitors, attendants, &c. On the following day the number was almost as great, amounting to 1821; and on Saturday fully 2400 paying visitors passed the turnstile. It would almost seem as if the pecuniary success of the undertaking were assured, notwithstanding the enormous outlay incurred by the Committee with the view of making the exhibition surpass everything of the kind previously held, alike as to the completeness and the scientific and practical interest of the several departments embraced in it. The jurors are still busily engaged in their adjudicating duties. In connection with the heating and cooking appliances, the gas and air motors, &c., it is confidently anticipated that a great mass of most interesting and valuable information will be accumulated, a summary of which will probably be given to the scientific world through the medium of the Proceedings of the Philosophical Society of Glasgow. Amongst the many distinguished persons who have visited the exhibition, I may mention Sir William Harcourt, Home Secretary, who paid two visits to it, one on Friday afternoon and the other early on Saturday morning, in company with Lord Provost Collins, whose guest he was during the latter part of last week. The right honourable gentleman took much interest in the unequalled collection of safety lamps shown in the exhibition, as also in some of the cooking and heating appliances, and in Sugg's photometer, the latter being explained to him, along with the "sulphur test," by Mr. D. M. Nelson, Mr. Sugg's agent in Glasgow.

Steps are being taken to promote a Bill in the next session of Parliament for the amalgamation of the district of Halfway with the Royal Burgh of Irvine, and certain clauses in the proposed Bill deal with the power to acquire the gas-works. When the subject was under consideration on Saturday week, at a meeting of the Local Authority of the parish of Dundonald, Mr. M'Jannet objected strongly to a clause by which it was proposed to confer on the Corporation an absolute monopoly of supplying the town with gas or other means of artificial illumination, and it was eventually agreed to make express provision for the right of the proprietors of any public works to erect gas-works for their own private use, or for any private individual to use the Corporation gas or not as he might choose. It was also agreed to make 7s. 6d. the maximum price of gas per 1000 cubic feet.

While addressing a meeting of Dumfries municipal electors last week, Treasurer Lennox spoke of the Corporation gas-works as progressing favourably, and said he had no doubt that under the good management of Mr. Malam they would be found to be more successful than ever. At the present time they got 13,300 cubic feet of gas from every ton of coal, and he would challenge any town in Scotland to produce a like result.

The gas question is one of the main issues of the municipal election campaign now in progress in the town of Kilsyth, and it will rest with the ratepayers to say whether or not the gas supply undertaking of the town is to pass into the hands of the Burgh Commissioners, or remain in the hands of the Gas Company.

Councillor Reid, a gentleman who holds a high position in Glasgow as a mechanical engineer, had something to say on the gas question when addressing his constituents last week. He mentioned that by the introduction of mechanical power instead of horses in the Corporation gas-works at Dawsholm and Tradeston, a saving of about £1700 per annum had been made; while £3600 had been saved by the closing of the works at Partick, which, he said, were carried on more for the benefit of the officials than the ratepayers. The use of mechanical power was a matter in which he had specially interested himself. He further remarked that some Councillors had been prophesying that there would next year be another reduction in the price of gas to the extent of 2d. per 1000 feet, which meant a decrease in the revenue of £13,000; but he could not see how this was to be brought about, unless coal could be bought at a lower figure than at present, or by a further reduction of expenditure by a more extended employment of mechanical power.

The gas managership vacancy at Dawsholm station, under the Glasgow Corporation Gas Commissioners, is no sooner filled up, as recently mentioned, by the appointment of Mr. Mitchell, of Coatbridge, than the vacancy caused there by his resignation is the subject of considerable interest amongst gas managers throughout Scotland, a large number of whom have already entered the lists as candidates for the appointment.

Following up the resolution recently come to by Young's Paraffin Light and Mineral Oil Company, with regard to the discontinuance of the supply of gas for their great works at Bathgate, after going on for about 14 years, the Bathgate Gas Company have entrusted Mr. Hislop, of Paisley, with the complete reconstruction of their works for the direct supply of coal gas produced in the ordinary way, so as to meet the largely increased consumption of gas since the date when the contract with Young's Company was entered into. The works are expected to be ready about the middle of November. The make of gas calculated for in the re-construction is about 10 million cubic feet; and the make to begin will be about 7 millions.

The Glasgow pig iron market was very strong last week, and as high as 52s. 5d. one month, and 52s. 2½d. cash, were paid on Friday afternoon.

A further improvement is manifesting itself in the Scotch coal trade.

CURRENT SALES OF GAS PRODUCTS.

(FROM A MANCHESTER CORRESPONDENT.)

There has not been any change in the general state of the market here since my last. Tar has been in good demand at 30s. to 38s. per ton. Ammoniacal liquor has sold freely at 23s. per ton, for sp. gr. 1·035. The following prices have been realized:—Ammonia sulphate, white, £19 10s. to £20 per ton; grey, £18 15s. per ton—both easy of sale. Ammonia chloride, white, £35 per ton; grey, £29. Brown vitriol, 58s. per ton. Muriatic acid, 27s. to 30s. per ton. Oxide of iron, 30s. per ton.

SALE OF GAS SHARES AT WAKEFIELD.—Last Friday, 40 £5 shares in the Wakefield Gas Company were sold at £11 17s. 6d. each, and 10 more at £11 18s. each. Some £5 fully paid-up shares in the Rothwell Gas Company were, on the same occasion, sold at from £6 to £6 3s. each; and £5 shares, £3 10s. paid up, at £4 1s. 6d.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is a steady improvement generally going on in the coal trade of this district, and in some cases collieries are now busily employed. The increased demand is, however, still chiefly for ordinary kinds of fuel, and these are not only going off tolerably well for local consumption, but a good deal of coal is now being sent out of the district both to the London market and for shipment, and there is a decidedly stronger tone in prices, which it is not improbable may lead to a general advance next month. In gas-making coals there is little or nothing doing beyond deliveries, which, however, are rapidly increasing, except in a few small sales to private consumers, for which rather better prices are obtainable; but where there is any competition to meet, very low prices have still to be quoted. Cannel is going off very freely, and a good deal of this class of fuel is being shipped. Steam and forge coal, and engine classes of fuel, are still without material change, there being no appreciable increase in the consumption of common round coal for manufacturing purposes, whilst the increased production of slack is at present being generally met by the larger requirements for small use and other purposes, consequent upon the colder weather. Burgy and slack are, however, if anything, beginning to hang in the market, and there is a tendency to rather more ease in prices. The average quotations at the pit mouth may be given about as under:—Best Wigan Arley, 8s. to 8s. 6d.; good screened qualities, for gas-making and other purposes, 6s. 6d. to 7s.; Pemberton four-feet, 6s. 6d. to 7s.; common Wigan mines, 5s. to 5s. 6d.; burgy, 3s. 9d. to 4s. 3d.; and good slack, 3s. to 3s. 6d. per ton.

In the iron trade business continues extremely dull. Consumers here do not believe in the continuance of the improved tone reported from other districts, and as they are mostly well supplied for the present, they decline to buy. Local makers of pig iron are weak, and are open to offers below their nominal quotations of 46s. 6d. to 47s. 6d. per ton, less 2½, delivered into the Manchester district, whilst some of the outside brands are offered for delivery here at considerably under these figures. In the finished iron trade business can only be done at very low prices. Bars delivered into the Manchester district are quoted at about £6 per ton, but for prompt specifications £5 15s. would in some cases be taken. Both gas and water pipes are being offered at extremely low figures; for delivery into the Manchester district the lowest sellers are quoting about £4 12s. 6d. per ton, and the Heywood Local Board have just entered into a contract for 4-inch and 6-inch pipes, with Smith's patent coting, delivered at Heywood or Middleton, at £4 12s. 6d. per ton, the tenders, of which there were a large number, ranging up to as high as £6 2s. 6d. and £6 5s. per ton.

NOTES FROM MONMOUTHSHIRE AND SOUTH WALES.

(FROM OUR OWN CORRESPONDENT.)

The Newport coal trade continues firm, although there is a decrease of shipments on the preceding week of 16,202 tons against 16,895 tons. A fair share of orders has been secured by the ironmasters, exports of iron amounting to 135 tons, and of coke to 35 tons, have been effected, the last-named commodity being below those for the previous week. The demand at Cardiff for coal during the past week has been very favourable—viz., 108,264 tons against 97,404 tons for the previous week. In iron and copper there was a limited demand, only 456 tons being exported, and a trifle over 500 tons of coke.

The United States are steadily coming forward with orders for iron and steel rails, and there are immediate shipments to the Continent and Colonies in request, and a large demand for home use and extensions, nearly all the mills being in full employ. The orders lately arrived have been more extensive, and rails of heavier weight than have been turned out of hand for some time past have been wanted, the steel mills having been kept at work extra hours for the last week or so; and in order to meet the demand, the iron rail mills have been fully employed. This evidently shows that both iron and steel have once more taken root in the district, and it is generally believed, by those well acquainted with the trade and neighbourhood, that this improvement has a sound basis.

Tin-plate steel bars are in excellent request, there being an increased quantity turned out of hand. There has been no material increase in the demand for bar iron during the last few days. Fish-plates are in good demand, and a visible increase in the output daily. Large quantities of puddled bars are turned out, being almost taken direct to the balling furnaces and converted into rails. The production of grey pig iron continues, and a ready sale is effected at a decent profit. I need hardly state that in consequence of the iron trade combined with the steel being so brisk, the collieries in connection therewith are being fully developed. The tin-plate trade remains unaltered both in make and quotations, stocks being still on the increase; makers are expecting increased orders from America and Australia.

At the London and South Wales Colliery Company's Risca pit, where the unfortunate calamity occurred some few months since, they have now commenced sending coal to the market, and it is to be hoped that the usual activity may again show itself.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The recent cold weather has had the effect of materally increasing the demand for coals, both in the cheaper and best qualities. The tonnage transported from the district during the last two or three weeks has been considerably increased. Competition with the South Wales collieries is, however, great, and is experienced most by the Cannock Chase colliery owners, who do a heavy business with the London market. All classes of coals are plentiful, and notwithstanding the increase in the sales of the better qualities, rates are very low. Contracts are scarce, and owing to the severe competition, prices are in the majority of cases cut down to the lowest farthing. Forge and furnace requirements are not so great as they were a month ago. This is partly the result of a check in the iron-smelting business, there being a lesser number of furnaces in blast at the present time than there were a month ago. Gas coals are dull, but there is a good inquiry for rough slack and the cheapest iron-making fuel. Cokes are reported to be a little cheaper than they were a fortnight since; prices are nevertheless kept up for the best imported kinds.

The iron trade is far from brisk, and a downward tendency has been visible since the quarter-day meetings. Makers of finished iron report that they have received more favourable orders since the reduction in this article was made. Such orders are, however, far from being important, and in the majority of cases have sprung from customers who withheld their investments until the quarter-day meetings had turned. £6 10s. is the average rate at which unmarked bar sales are made; but marked bars are receiving but little attention. Hoops, sheets, and girders are in better order than most other kinds of finished iron. The puddled iron trade is very dull, and prices are consequently weak and unremunerative. Pigs of all classes are selling badly; even the best local makes find but a poor demand.

The export trade shows but little sign of improvement. The chief business done during the past few weeks has been confined mainly to America and the Indian and Cape markets. On the whole the prospects

in the iron trade of this district are not so good as they were at the commencement of the last quarter; a hopeful spirit, however, exists as to the future. Ironfounders, tube makers, and edge tool manufacturers are in the majority of cases steadily employed.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Very little alteration of a material nature can be quoted with regard to the finished iron trade throughout Yorkshire. Many of the larger and more important firms have a fair amount of work on hand, but contracts have had to be placed at very slight profits. The rail and merchant mills are in some instances not very active, whilst the foundries devoted to the production of general castings have not over much to do. Considerable interest is just now being attached to the use of coke-preparing machinery, appliances for washing and grinding the coal being freely adopted throughout the country. The Bessemer Steel Works are busy, there being several good foreign orders in hand. The make of rails in particular is large. The blast furnaces, generally speaking, are kept going, and are supplied with ore from North Lincolnshire, local ironstone being scarce.

The reports which come to hand from the West Yorkshire collieries are of a more encouraging nature. The pits in the Methley district are working five and six days per week, and in all probability an improved business will follow, seeing that the men have agreed, in accordance with their sliding scale, to submit to a reduction of 2½ per cent. during the next four months. The steam coal trade to Hull and Goole is scarcely so active as it was, but some of the largest firms are sending a fair tonnage.

The general coal trade in South Yorkshire maintains the improvement already noticed, but coalowners declare that they have been unable to get any material advance of prices, owing to the keen competition which they have to meet. Business with London has increased, owing in a great measure to the severity of the weather and the desire of merchants to lay in stocks for the winter months. The tonnage rates remain unchanged; but it is reported that the Great Northern Railway Company have come to the conclusion to disallow a certain drawback which they have hitherto given to Derbyshire coalowners using their lines, which will slightly benefit the South Yorkshire masters, inasmuch as the rate from Derbyshire will be a trifle improved. The demand for both Silkstones and Barnsley thick-seam coal for the Eastern Counties is on the increase, and the opinion gains ground that if the miners were more sensible in their requests trade might somewhat improve.

The gas coal contracts are pretty freely supplied, and arrangements have been made at both the Wharncliffe Silkstone and Hoyland Silkstone collieries for work to be carried on, so that no interruption will, it is to be hoped, occur to business. Locomotive and manufactory coal are in moderate request, the former being for the most part supplied to large railway companies, and the latter to the Lancashire and Yorkshire cotton and woollen districts.

The coke trade still bears evidence of considerable vitality, and in consequence of some of the pits being set down the demand for slack and smudge is on the increase. The whole of the pits belonging to Thorpe's Gawber Hall Collieries, Limited, are standing, but the entire range of ovens, numbering about 100, are kept going, fuel being obtained at various places in the district. The same may be also said with respect to the Church Lane Colliery, where some capital coke is being turned out.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The weather is extremely stormy in the North Sea. The wind is from the north-east, and down to Saturday it had been found impossible for sailing vessels to work down to the coal ports. The colliery offices were short of tonnage during the whole of last week, and steamers were likewise scarce. Under these circumstances gas collieries have experienced some difficulty in getting their orders away, and the tendency of freights has been towards higher prices. Of course, when there are no ships to take freights, mere quotations are of little value, but the offers for handy tonnage show a rise of fully 1s. per ton upon summer rates for sailing vessels, and when they are needed—as nearly all the boats engaged in the gas trade run under twelve or six months engagements—6d. to 9d. per ton are accepted on steam tonnage. The Durham gas collieries are very fully employed, and as the steamers arrive they are loaded with despatch; therefore, in the London and the main trades, business goes on regularly enough. It is in the trade to the Channel and to the bye-ports wherein the delay arising from the scarcity of tonnage is most felt. The Baltic gas companies are completing their stocks of coals before the winter comes, and it threatens to be an early one in Russia and Germany. There has also been a demand for steam tonnage to load gas coals for the Mediterranean. More money has had to be paid in freight. The general coal trade of the North of England is somewhat stronger. The advance of 1s. per ton made upon house sorts is maintained. There is more demand, too, for manufacturing coals, but no advance in price. All classes of steam coals are in better request. Nut coals are more inquired after. There is little doing in coke, and prices are somewhat easier.

The demand for finished iron is less active, but it is still pretty strong. The Tyne and Wear ironfoundries are doing a large trade in the manufacture of castings, but the business is not active in the manufacture of water and gas pipes. The lead trade is dull. Prices of Spanish, Rhenish, and English are lower, and the market is depressed. The timber trade of the north-eastern ports shows no improvement, and the demand for building timber is slack. Prices are rather stagnant.

REDUCTION IN THE PRICE OF GAS BY THE ROTHWELL GAS COMPANY.—At a recent meeting of the Directors of this Company it was determined to reduce the price of gas from 5s. to 4s. 7d. per 1000 cubic feet, the reduction to date from the 1st inst.

THE NEW PURIFIERS AT THE MANCHESTER GAS-WORKS.—Messrs. Newton Chambers, and Co., of Thorncliffe Iron-Works, near Sheffield, have just finished a very good piece of work, in a short space of time, for the Manchester Corporation, at their Rochdale Road Gas-Works. It consists of six purifiers 27 ft. 6 in. by 21 ft. 6 in. and 6 feet deep. The lutes were cast upon the side plates, and are 8 inches wide by 2 ft. 9 in. deep. All the connections are 24 inches in diameter, and are worked by twenty-nine rack and pinion slide-valves. All the joints of the plates are planed. The covers are of wrought iron in the usual way, and the whole comprises 240 tons of cast iron, 65 tons of wrought iron, and 17,000 feet of wood sieves. The order was given on the 16th of July, upon condition that the work should be completed and handed over to the Corporation on the 9th of October. This was done, and a considerable quantity of oxide had been placed in the boxes on that day. They were tested with air to 24 inches pressure, and four of them were at full work, with gas passing through, on the 16th inst. The Engineer (Mr. J. West) expressed himself as much pleased with the energy displayed by the Contractors, and with the quality of the work.

SALE OF SHARES IN, AND REDUCTION IN THE PRICE OF GAS BY THE RYDE GASLIGHT COMPANY.—Last Thursday, Messrs. E. Marvin and Sons sold by auction some £12 10s. shares in the above-named Company—viz., 23 "original" shares, paying maximum dividends of 9 per cent., which realized £21 12s. 6d. per share; and 46 "ordinary" shares (7 per cent. dividend), which sold at prices from £16 15s. to £17 each. Notice has been given by the Directors of the Company that from and after the taking of the indices of the meters at Christmas quarter next, the price of gas to all consumers will be reduced from 4s. 6d. to 4s. 2d. per 1000 feet.

SALE OF SHARES IN THE SHEFFIELD GAS AND WATER COMPANIES.—On Tuesday last a number of shares in the above undertakings were offered for sale in Sheffield. £400 worth of consolidated A stock in the Gas Company was withdrawn at £194 per cent.; £201 12s. consolidated class B stock was withdrawn at £191 per cent.; £180 consolidated class C stock, sold at £193 per cent.; and 23 ordinary £10 shares sold at £11 7s. 6d. per share. 18 class D preference shares in the Water Company were disposed of at £10 15s. per share; 18 class E preference shares were purchased at £4 14s. per share; and 18 class F preference shares sold at £1 13s. per share.

THE PRICE OF GAS AT PLYMOUTH.—In the JOURNAL of the 12th inst. it was announced that the Plymouth and Stonehouse Gas Company had notified their intention of reducing the price of gas supplied to private consumers to 2s. 1d. per 1000 feet from Michaelmas. At the meeting of the Plymouth Town Council on Wednesday last, the Town Clerk read a communication from the Secretary of the Company, informing him that from the 30th of September, the charge for the public lamps would be reduced to £2 15s. 10d. per lamp per annum, the charge to which the Company are entitled under their contract being £2 17s. 2d. On the motion of Mr. Morrish, seconded by Mr. Pitts, a vote of thanks was accorded to the Company.

THE GAS SUPPLY OF BARNSLEY.—At the meeting of the Barnsley Town Council on Tuesday last—the Mayor in the chair—the following minutes passed by the General Purposes Committee, relative to the suggested purchase of the Barnsley Gas Company's works, appeared on the business paper:—"The Committee considered the expediency of purchasing the gas-works or otherwise, and, after considerable discussion, resolved—'That, considering the probability that lighting by gas will shortly be superseded by other means of lighting, and that the Gas Company when last applied to expressed themselves as not wishful to sell their property, the Committee recommend the Council not to take any steps for the purchase of the gas-works. The Committee consider that the gas-works are not sufficiently rated compared with other property in the town, and recommend that the Overseers be requested to re-assess the gas-works." After some conversation relative to a requisition which had been forwarded to the Mayor on the above matter, it was decided to call a public meeting to consider the question of purchase, and the Council then went into committee on the subject.

THE BIRKDALE SEWERAGE WORKS.—On Friday, the 8th inst., the Birkdale Sewerage Works, which have been in course of construction since 1875, were formally opened by Mr. F. Hillé, inventor and patentee of the system that will be there employed for treating the sewage. The works are situated at the top of Aughton Road. The sewage enters through screening chambers, and from them into an underground reservoir, which will hold 500,000 gallons of sewage. From this reservoir the sewage is conducted into a pumping well, where it receives the necessary chemicals, and is lifted by two 10-horse power engines into two depositing tanks with a capacity of 370,000 gallons. From these, after precipitation has taken place, the effluent or purified sewage passes on to filter-beds 1¾ acres in extent, divided into five separate beds that will be used in rotation, so as to ensure complete aëration or oxidation. Previous to the chemicals being sent into the pumping well they are mixed in the mixing pan, whence they are delivered into two mixing cylinders fitted with agitators, and thence pass into the well named. All the treated sewage, before being discharged into the brook, is passed over the filtering-beds. The extent of the ground covered by the sewerage works approaches 5 acres.

THE WATER SUPPLY OF CONSETT.—Mr. W. M. Stock, Public Analyst for the county of Durham, has, at the request of the Consett Local Board, made an analysis of the water supplied by the Consett Water Company, Limited, and the result has been made public. After giving a tabulated analysis, Mr. Stock says the sample of water submitted to him "contained a considerable quantity of matter in suspension, which, under the microscope, proved to be chiefly decaying vegetable tissue, along with which were many forms of living animal and vegetable microscopic organisms, the most objectionable of which were certain species of worms and some fungoid growths." Mr. Stock adds: "The conclusion I have arrived at from a careful review of my analysis of Consett water, as given above, is that, with efficient filtration, it would form one of the finest water supplies in the kingdom; but that in its present condition of turbidity, having due regard to the cause of that turbidity—namely, the presence of decaying vegetable matter in suspension, along with fungoid growths and animal organisms of repulsive type—I do not consider it fit for human consumption." A copy of the above report has been sent to the Water Company, with an intimation that unless something be done forthwith to render the water pure, the assistance of the Local Government Board will be invoked.

THE PUBLIC LIGHTING OF TETTENHALL.—On Monday last week a public meeting was held at Tettenhall to consider the advisability of the lighting of certain parts of the parish by gas being undertaken by the ratepayers. Mr. H. H. Fowler, M.P., presided, and explained that the Road Trustees would cease to light the main Holyhead Road after the end of this month, and the meeting was called to ascertain whether or not the ratepayers would undertake the lighting of not only the main road, but the hitherto unlighted parts of the parish also. Mr. E. Pritchard stated that by the Lighting Act of 3 & 4 Wm. IV. the ratepayers would have to elect not less than three nor more than twelve inspectors, who would have absolute power to say where lamps should be erected, and to enter into contracts for the supply of gas. If the Act were adopted it could not be for less than three years, and the money must be collected only by rate levied on the full assessment of houses, buildings, and gardens, and upon one-third the assessment of land. He sketched the district which it would be best to include. There were at present in the parish 78 lamps. To light the area suggested, 124 lamps would be required, which, at £2 13s. 3d. per lamp as the cost of maintenance from Sept. 1 to April 30, would be equivalent to a rate of 6d. in the pound. This was reckoning upon a 5-feet light, but he was informed by the Chairman that in Wolverhampton only 4-feet lights were used, and if the latter were adopted the cost would be 8s. per lamp less, and would reduce the rate by about ¾d. in the pound. It was decided by 30 votes to 22 to light the district sketched out by Mr. Pritchard. The matter, will, however, be submitted to another public meeting, before any decision is arrived at.

THE WATER SUPPLY OF ALFRETON.—On Wednesday last, Mr. R. Morgan, C.E., one of the Inspectors of the Local Government Board, held an inquiry at Belper in reference to an application from the Belper Rural Sanitary Authority for sanction to borrow £10,000 for works of water

supply for the contributory place of Alfreton. The Inspector having briefly stated the nature of the application, Mr. Pym explained that the first estimate of the cost of the works, as stated at the inquiry held at Belper in 1877, was put down at £24,498 12s. 5d. After that period some time elapsed before the sanction of the Local Government Board was given to the scheme. The prices both of iron and labour having advanced considerably, a second estimate was made, amounting to £26,184 9s.; but the first amount only was applied for, leaving a deficiency for the cost of the works amounting to £1685 17s. 6d. The extra cost of land was caused by the site of the Somercotes reservoir being undermined, and another site was selected at a lower level, the underlying coal having to be purchased to secure the safety of the reservoir. This alteration of level had made it necessary to have both high and low pressure services for one elevated district. The cost of the Riddings Water-Works, purchased by the Authority, was not included in the estimate. By the removal of the service reservoir to a lower level the Riddings supply would cost more, as larger pipes will be required to carry the same volume of water. The gas-mains and sewers had been laid without plans being made of their position, and had caused some trouble to avoid them when laying the water-pipes. Other evidence having been taken, the Inspector intimated that he would report to the Local Government Board on the matter.

The Liverpool Corporation (Vyrnwy) Water Scheme.—At a special meeting of the Liverpool City Council on Wednesday, the 13th inst.—the Mayor (Alderman Hall) in the chair—Mr. Grindley moved—"That the Water Committee be requested to make a return of the entire costs in connection with the Vyrnwy water scheme, from the outset to the passing of the Act, including all parliamentary and other expenses of promoting the Bill in Parliament." Alderman Samuelson seconded the motion, and in doing so said an important matter had been started since the last meeting of the Council—he alluded to the appointment of a Water Engineer—and he should have been more pleased if they could have had some idea given them as to the future liabilities of the Water Committee, as well as the past expenditure. The motion was adopted.—At the meeting of the Water Committee on Monday last week, a vote of thanks was passed to the Chairman (Mr. Wilson) for his services in connection with the Corporation water scheme, and that gentleman, in acknowledging the vote, said it was a matter for congratulation that the Vyrnwy scheme, which was the scheme of the Water Committee, and the plans for which had been prepared by their own staff, should have received parliamentary sanction. He anticipated from the constant service of water an ultimate saving of £50,000 per annum, which it was estimated would pay the interest on the money laid out upon the scheme without increasing the water-rents. The Committee had, he said, a magnificent estate, with an overflowing revenue, a good staff, and a water scheme which, with energy and determination, should five years hence relieve Liverpool from any fear of a water famine for the next century.

The Public Lighting of Winchester.—The "high and mighty" notions of the Winchester Town Council, in respect to the employment of the electric light for illuminating the streets of the borough have received a rude rebuff, if one may judge from the remarks of the Ex-Mayor (Captain J. C. Moore), at a recent banquet to the representatives of the principal institutions of the city, corporate officers, &c. Captain Moore, replying to the toast of "The Corporation," is reported to have said that he knew of no particular work on which it was necessary to speak, except one that was mooted a few months back, for the purpose of extricating the city from semi-darkness by the adoption of the brilliant electric light. Having heard nothing respecting it lately, the citizens probably now regarded the subject as only a nine days wonder. But this was not so. He and others entertained the opinion that it was perfectly adaptable to the city, and he was sanguine enough to say that, had not one or two obstacles interposed, it would have been carried out in Winchester. A few of the members of the Corporation deputed to report on the feasibility of lighting the city by electricity had visited London, and the result was that the deputation were so convinced of the superiority of the light, and the desirability of introducing it into Winchester, that application was made to the Local Government Board for sanction to borrow the necessary money on the security of the city rates. They, however, declined to grant their sanction, on the ground that the practicability of the system of lighting public streets by electricity had not been sufficiently tested. The Town Council then applied to the patentees to advance the requisite amount, but they declined, having already so many pecuniary demands upon them. The consequence was that at present the idea of adopting the new light was in abeyance.

Presentation of a Testimonial to Mr. Levi Monk, of Lanark.—On Thursday, the 14th inst., about 50 friends and acquaintances of Mr. Levi Monk met at the Clydesdale Hotel, Lanark, for the purpose of presenting him with a testimontal on his leaving to fill an appointment at Colombo, in Ceylon. Provost Lamb occupied the chair, and Mr. J. Annan, solicitor, was croupier. After doing honour to the loyal toasts, the Chairman said it was a most pleasant duty he had to perform that evening—the presentation of a testimonial to their friend Mr. Monk. Mr. Monk had been seven years among them, and during that time he had not only gained public friendship as well as that of the Gas Company, but he had, with the support of that Company, greatly improved the works, which enabled them to reduce considerably the price of gas, and under his management the affairs of the Company had materially improved. He could assure Mr. Monk that he had the best wishes of his many friends in Lanark. He then, in the name of the subscribers, presented him with a handsome gold watch (the inner case of which bore an appropriate inscription) and Albert guard, and a lady's gold chain for Mrs. Monk. A toast of "Long life and prosperity to Mr. and Mrs. Monk" was then enthusiastically received. Mr. Monk, in acknowledging the presentation, thanked the donors both for Mrs. Monk and himself, assuring them that he could not express his feelings and sentiments at that time. He was glad his efforts to improve the affairs of the Gas Company and the gas supply to the public had met so much approval. He had simply done his duty, and he was proud to think that the prospects of the Company were so much brighter than when he took their business in hand. A gas manager had many to please and some opposing interests. It had always been his duty to "do the right," and to live in peace and harmony with all men, and the event of the evening showed that he had been so far successful. He valued the gifts most highly, but there was something evinced in the meeting that he valued far higher, and that was the goodwill of honest men. If he and Mrs. Monk had known there had been so much warm friendship towards them in Lanark, nothing would have tempted them to leave it. Mr. Monk sat down amidst great cheering. Among the other toasts were "The Lanark Gas Company." Altogether the evening was spent most enjoyably.

Improved Street Lighting at Birmingham.—The *Birmingham Daily Post* says: "For a considerable time past mention has from time to time been made at the meetings of the Birmingham Town Council of the experiments conducted by the Gas Committee with a view to the adoption of some system of gas lighting which will compete with the electric light for the purpose of illuminating large public spaces. The public will shortly have an opportunity of judging of the result achieved. The Gas Committee have made careful trial at the Windsor Street works of all the improved forms of gas lamps which have been tried in London and Paris, with the modifications suggested by their own Engineer and the various lamp makers. The aim has been to ascertain two points—the most effective burner relatively to the quantity of gas consumed, and the form of lantern which best diffuses the light afforded. Upon the former point, the Committee have decided in favour of a triple cluster of Bray's bat's-wing burners; and upon the latter, the experiments have conclusively demonstrated the superiority of a globular form of lantern over any of the angular patterns. It is proposed, and the work is now in progress, to place upon the refuge in front of the Council House a standard bearing five globes, and along the frontages of the Council House 8 standards, with three globes each, while 34 posts with single lanterns will be distributed at intervals of 50 or 60 feet along the footpaths of Paradise Street, the end of New Street, and the thoroughfares round the Town Hall. A standard with a group of five globes will also be placed at the junction of Paradise Street, Suffolk Street, and Easy Row. Returning to the details of the illuminating apparatus, it should be stated that the burners are fitted on to a special form of tap, designed by Mr. Hunt, the Engineer at Windsor Street works, by whom the trials have been principally conducted. Upon each tap four burners are fixed, but only three are intended to be alight when the greatest illumination is needed. The centre one is to serve two purposes—in the first it will afford a 'flash light,' or small jet to burn all day, and from which the other burners are lighted, and in the second place it will burn at full height by itself during the later hours of the night, when the others are turned out. Each burner consuming 10 feet of gas per hour has a flame measuring 4 inches in height and 3½ inches in width, and having an illuminating power equal to 30 sperm candles. The three jets in each lantern, though close together, burn separately without blending their flames as in duplex and triplex jets, and therefore the total illuminating power of each globe will equal 90 candles, as the result of burning 30 feet of gas per hour. It will thus be easily imagined that a group of five such globes will afford a very intense blaze of light. With regard to the standards and globes, there can be no dispute that they are more pleasing to the eye than the majority of patterns of street-lamps. Each globe has a diameter of 27 inches, and the ribs are as thin as possible, so as not to obstruct the light. The inside of the upper part is lined with opal plates, the reflection from which will dissipate to some extent the shadow of the post, and each globe has a special construction of chimney to carry off the heat, and prevent down-draught. The standards, which are of tasteful design, are supplied by Messrs. Hart, Son, and Peard, of Birmingham. The work of erecting the lamps will be finished in time to allow them to be lighted on the 26th inst. [to-night], when it is anticipated that they will have the effect of rendering the vicinity of the Town Hall more brightly illuminated than the open spaces in Paris at which the electric light is used, and at a more moderate cost."

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

4098.—Dick, G. A., Cannon Street, London, "Improvements in the construction of furnaces for the manufacture of coke, distillation of gas, and for other similar purposes." Oct. 9, 1880.

4100.—Woodward, J., Manchester, "Improvements in valves for gas and other fluids." Oct. 9, 1880.

4156.—Jones, F., Birmingham, "Improvements in or applicable to gas-burners and in globe-holders for the same, such globe-holders being also applicable to other burners." Oct. 13, 1880.

4159.—Kesseler, C., Berlin, "Improvements in the 'Simons' steam gas motor with burning flame in the cylinder." A communication. Oct. 13, 1880.

4167.—Wates, P. J., Balham, Surrey, "Improvements in apparatus for extracting tar and other impurities from gases or vapours." Oct. 13, 1880.

4196.—Love, W., Glasgow, "Improvements in apparatus for heating and ventilating by means of oil or gas, and in part applicable to lighting apparatus." Oct. 15, 1880.

4242.—Lake, W. R., Southampton Buildings, London, "An improved apparatus for regulating or controlling the flow of gas or other fluids." A communication. Oct. 18, 1880.

4254.—Benson, W. A. S., Kensington, London, "Improvements in apparatus for the distribution of artificial light." Oct. 19, 1880.

4260.—Robinson, H., Manchester, "Improvements in gas motor engines." Oct. 19, 1880.

4270.—Beechey, C. G., Hilgay, Norfolk, "Improvements in gas motor engines." Oct. 20, 1880.

4278.—Bull, H. C., Brooklyn, U.S.A., "Improvements in and relating to the manufacture of coke and residuary products, and ovens and apparatus appertaining thereto, parts of such apparatus being applicable otherwise." Oct. 20, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1512.—Hills, W. A., Saltney, Flint, "The utilization of alkali waste, gas lime, or other forms of lime, for the production of tri-calcic and di-calcic phosphates." April 13, 1880.

1539.—Liddle, E., Preston, Lancs, "Improvements in apparatus for lighting and heating by gas, applicable in part for igniting fuel to produce coal or other fires." April 15, 1880.

1567.—Engel, F. H. F., Hamburg, Germany, "Improvements in automatic apparatus for lighting, regulating, and extinguishing gas-burners." A communication. April 16, 1880.

1662.—Hartley, F. W., Wandsworth Road, London, "Improvements in gas cooking apparatus." April 22, 1880.

1692.—Williams, H., and Malam, J., Southport, Lancs, "Improvements in and relating to atmospheric air and gas motor engines." April 24, 1880.

1792.—M'Farlane, J., Glasgow, "A new or improved construction of water motor, also applicable as a water-meter." Partly a communication. May 1, 1880.

1933.—Preston, F. P., Prestige, J. T., and Preston, E. J., Deptford, London, "Improvements in apparatus for regulating and controlling the flow of water and other liquids, and preventing waste of same." May 11, 1880.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

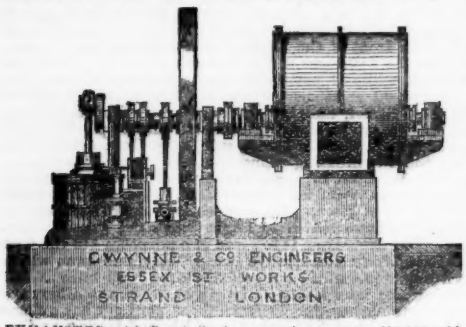
3618.—Longshaw, J., "Improvements in the method of and apparatus for lighting street and other gas lamps." Sept. 27, 1877.

3706.—Annell, O., "Improvements in gas governors or regulators." Oct. 5, 1877.

3817.—Hammond, J., "Improvements in purifying coal gas." Oct. 15, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

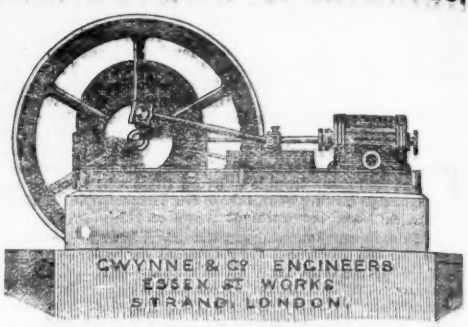
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

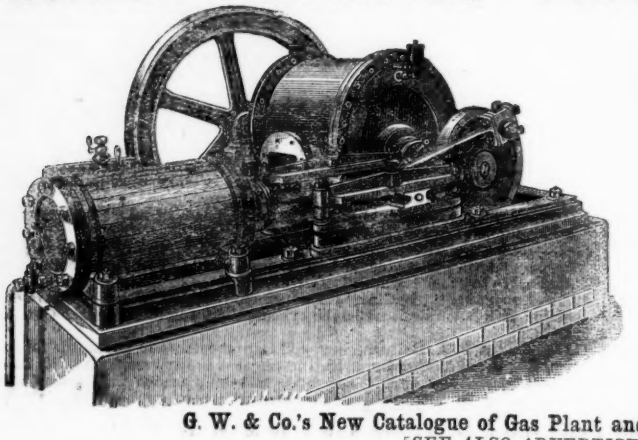
GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH

Wrought-Iron Spindles and ENGINES COMBINED.

SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE* 670.]

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of a Pamphlet, prepared for Gas Companies to distribute to Gas Consumers—"Cooking & Heating by Gas;" on Burners, &c.
Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by the Advertiser, a Young Man, aged 27, an Engagement in a Gas Company's Office, Assistant Engineer, or Clerk of Works, &c., has had every experience in a Gas-Works. First-class testimonials and references.
Address No. 695, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

WANTED, by a Young Man (married), a Situation in a Gas-Works. Is the son of a Manager, and is a good Main and Service Layer. Can do any Fittings in the Retort-House; also can Fix and Read Indexes of Meters, and has had experience both at Lathe and Vice. Very steady.
Apply to the MANAGER, Gas-Works, Crayford, KENT.

WANTED.—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references.
Address No. 678, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, aged 21, is desirous of an Engagement on Gas-Works. Can Read and Fix Meters; has had good experience of the Lathe, and is willing to be generally useful.
Address R. C., care of Messrs. Willey and Co., Gas Engineers, EXETER.

MANAGER and Gas-Fitter in a small Works wants a Situation. Seven years reference.
Address E. B., Barnham, SOMERSET.

WANTED, by the Rugby Gaslight and Coke Company, Limited, an Active, Steady Man, as FOREMAN for the Works. He will have to Lay Mains and Services, take Indexes of Meters, and attend to complaints. Wages 23s. per week, with house, coal, and gas.
P. SIMPSON.

MANCHESTER CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive APPLICATIONS for the Appointment of an Experienced MANAGER at their Rochdale Road Station, at the salary of £300 per annum.
Applicants must have a thorough practical knowledge of the Manufacture and Purification of Gas upon the most approved modern system, and be fully acquainted with the Construction and Working of the various Apparatus employed therein, and must have had experience in the control of large numbers of men.
The Manager will be required to devote the whole of his time to the duties of the position.
Applications, stating age and experience and enclosing testimonials, must be sent in not later than Twelve o'clock noon, on the 30th of October, addressed to the Chairman of the Gas Committee, Town Hall, Manchester, and endorsed "Application for Appointment as Station Manager." Canvassing will disqualify.
By order,
JOS HERON, Town Clerk.
Town Hall, Manchester, Oct. 13, 1880.

DESIGNS and Specifications are invited for a GASHOLDER-TANK, 70 ft. diameter and 18 ft. deep, with TELESCOPIC HOLDER for the same.
Full particulars may be obtained on application to EDWIN A. WRIGHT, Secretary, Brecon Gas Company.

WANTED, by an established Foreign (European) Gas Company, a RESIDENT ENGINEER, who must be experienced in the Management of Gas-Works, and well versed in the details of the Manufacture and Distribution of Gas and Treatment of Residual Products according to the most recent and approved methods. Salary and commission from £350 to £500 per annum, according to qualifications.
Applications, with testimonials, to be addressed to ENGINEER, care of Messrs. WATERLOW AND SONS, 49, Parliament Street, WESTMINSTER, S.W., on or before NOV. 15.

WANTED, to Lease Gas-Works. Highest References.
Apply, by letter, to No. 686, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE.—A Second-hand Station-Meter to pass 4000 cubic feet of gas per hour, in good repair, with Valves, Bends, and Connections complete.
Offers to be addressed to the MANAGER, Alton Gas and Coke Company, Alton, HANTS.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the West Kent Gas Company invite TENDERS for all the surplus TAR at their Works, for One or Two years. As to Erith, to be pumped into Contractor's barges at the Company's Wharf upon the Thames. As to Crayford, to be filled into Contractor's casks or tank-vans at the Works. Quantity at each Works, 20,000 gallons more or less.
Tenders to be delivered sealed, and endorsed "Tender for Tar," on or before Monday, the 1st of November, at the Offices of the Company, No. 237, Southwark Bridge Road, London, S.E.
The Directors do not bind themselves to accept any tender.
ROBT. P. KEYS, Secretary.
Oct. 18, 1880.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of the above Company will be held at the Offices of the Company, 30, Gracechurch Street, in the City of London, on TUESDAY, the 16th day of November next, at Three o'clock in the Afternoon precisely, to receive the Directors Report and the Accounts of the Company for the Half Year ending the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The Transfer Books will be closed from the 3rd to the 16th of November next, both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Offices, 30, Gracechurch Street, London,
Oct. 19, 1880.

FOR SALE.—A Purifier, 10 ft square, 5 ft. deep, 10-in. Inlet and Outlet.

One 10-in. Centre-Valve for working four purifiers.

Two 6 ft. by 5 ft. Circular Cylinders.

One Lifting Screw for Purifier Lids.

A Condenser complete, with cast-iron Boxes, a double row of 10-in. Pipes, 8 in. each row, and about 28 ft. high, with 10 in. Inlet and Outlet, Connections, and Bye-pass, and three 10-in. Valves.

All the above are in capital condition. Also a quantity of Old Iron.

For further particulars, apply at the Gas-Works, Bromley, KENT.

THE Gloucester Gas Company have the undermentioned APPARATUS for Sale :—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, AND OTHERS.

THE Directors of the Shipley Gaslight Company are prepared to receive TENDERS for the Purchase of their surplus TAR and AMMONIACAL LIQUOR for One year, from Jan. 1, 1881.

The Company will load f.o.b. the Leeds and Liverpool Canal, at Shipley, or into the Contractor's carts at the Works.

The quantity of coal carbonized in twelve months is about 8000 tons.

Any further information can be had on application to the Manager.

Sealed tenders (stating separately price per ton for Tar and Liquor, and endorsed "Tender for Tar, &c.") to be sent in on or before Nov. 9, 1880.

JNO. WILCOCK, Manager.

Gas-Works, Shipley, Oct. 23, 1880.

MALTA.

LIGHTING BY GAS VALLETTA, FLORIANA, MARSA, SEN LEA, COSPICUA, & VITTORISSA.

SEALED Tenders will be received at this Office until noon of Monday, June 3, 1881, for Lighting by Gas the Streets of Valletta, Floriana, Marsa, Senglea, Cospicua, and Vittorissa, for a period of Ten years, to date from May 15, 1882.

Tenders to be on the established printed form supplied by this Office.

The conditions of the contract and further particulars will be made known on application to this Office.

Each tender is to be accompanied with a deposit of £200, which sum is to be temporarily lodged with the Receiver-General, to be dealt with as stated hereunder; and no notice will be taken of any tender unless the due fulfilment of this condition be found endorsed thereon by that Officer.

The deposit thus made shall be forfeited in favour of Government should the party tendering, or the surety, fail to appear for the stipulation of the requisite contract in the event of the tender being accepted, within three days from the day of the notice given to him to that effect.

The deposits of the unsuccessful tenderers shall be returned to them immediately after notice will have been given to the party whose tender will have been accepted.

Any notarial fees will have to be paid by the Contractor.

The undersigned retains the power of accepting or rejecting all or any of the tenders received.

C. BAPINET,
Acting Auditor-General and
Director of Contracts.

Office of the Auditor-General and Director of Contracts, Valletta, Oct. 7, 1880.

THE Directors of the Kingston-upon- Thames Gas Company are prepared to receive TENDERS for the SULPHATE OF AMMONIA manufactured at their Works between present date and the 30th day of December, 1880. Probable quantity about 50 tons.

Sample may be seen, and form of tender obtained, on application to the Engineer at the Works.

The Directors do not bind themselves to accept the highest or any tender.

Oct. 26, 1880.

TO TAR DISTILLERS.

THE Buxton Local Board invite Tenders for the Purchase of their Surplus TAR and AMMONIACAL LIQUOR for One, Two, or Three years, to be delivered into Contractor's tanks and weighed on the machine on the Works in Ashwood Dale.

Any other particulars may be obtained on application to Mr. Geo. Smedley, Gas Offices, Buxton.

Tenders, endorsed "Tender for Tar, &c." addressed to the Chairman of the Gas Committee, to be delivered not later than the 4th of November next.

JOSIAH TAYLOR, Clerk to the Board.

Buxton, Oct. 21, 1880.

CITY OF LIVERPOOL.

LAMP AND LAMP IRONWORK.

THE Corporation of Liverpool are pre- pared to receive TENDERS for the Supply of the following MATERIALS required for the Public Lamps during the ensuing Twelve Months, viz.:—

1. Copper Lamps, Street Name Tablets, and Glass.
2. Wrought-Iron Lamp Brackets and Standards.

Specifications and forms of tender can be obtained on application at the City Engineer's Office, Liverpool, between the hours of Ten a.m. and Five p.m., and on Saturdays up to One p.m.

Sealed tenders (which must be submitted on the form provided for the purpose), endorsed "Lighting Department, Tender No. 1," or "No. 2," as the case may be, to be left at the City Engineer's Office, Dale Street, Liverpool, not later than Twelve o'clock on Nov. 13, 1880.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
JOSEPH RATNER, Town Clerk.

Municipal Offices, Liverpool, Oct. 22, 1880.

GAS-WORKS FOR SALE.

TO BE SOLD by PUBLIC AUCTION, at the Mart, Rosemary Street, Belfast, on FRIDAY, the 12th of November, at One o'clock,

THE Gas-Works of Tandragee, an im- proving MARKET and MANUFACTURING Town in County Armagh, and within one mile and a half of CANAL and RAILWAY service from the seaports of BELFAST and NEWRY, accessible within an HOUR.

The Concern comprises all the Ground, Buildings, and Plant requisite for present make and further extension, including Dwelling-house and Shop at street frontage, Retort-House with four benches of Retorts, Coal-Stores, Condensers, Purifiers, Station-Meter, Gasometer, Governors, Tar-Well, Pump, Street-Mains, Consumers Meters, &c., &c.

The present GAS-RENTAL of £700 per annum can be largely increased.

The premises are held under FEE-FARM GRANT at an annual rent of £10.

Nine perches of adjoining Land have been added to the Premises, and are held for lives renewable for ever, FREE OF RENT.

If so desired, a portion of the purchase-money may remain as a first charge on the Property.

Intending Purchasers can make inspection any day previous to sale, and, for further particulars, may apply to
ALEXANDER MILNE & Co., 11, CHICHESTER ST.

And for Title to
R. A. MACRORY, Solicitor, ULSTER CHAMBERS.
HUGH C. CLARKE & SON, Auctioneers, Rosemary Street, BELFAST.

Oct. 15, 1880.

SOUTHPORT CORPORATION GAS-WORKS

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the Surplus TAR produced at the Gas-Works for a period of One or Two years from the 18th of November next

Further particulars may be obtained on application to Mr. Booth, Gas Manager.

Tenders, endorsed "Tar," to be sent in to me not later than Wednesday, Oct. 27 next.

By order,
J. H. ELLIS, Town Clerk.

Town Hall, Southport, Sept. 25, 1880.

TO TAR DISTILLERS.

THE Directors of the British Gaslight Company, Limited, invite TENDERS for the Purchase of the Surplus TAR—about 300,000 gallons yearly—produced at their Norwich Station for One, Two, or Three years, commencing on Feb. 10, 1881. The Tar to be delivered into the Contractor's tank barges alongside the Company's Works, and the quantity so delivered to be then agreed.

Any further particulars may be obtained on application to the Secretary, at the Chief Office of the Company, No. 11, George Yard, Lombard Street, where tenders are to be sent on or before Monday, Nov. 15, next.

The Directors do not bind themselves to accept the highest or any other tender.

FREDC. LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C.

TO MANUFACTURING CHEMISTS.

THE Directors of the British Gaslight Company, Limited, invite TENDERS for the Purchase of AMMONIACAL LIQUOR—about 500,000 gallons yearly—produced at their Norwich Station, for a term of One, Two, or Three years, commencing on Feb. 10, 1881. The Liquor to be delivered into the Contractor's tank-barges alongside the Company's Works, and the strength of the Liquor to be tested by Twaddel's hydrometer, as delivered into such barges.

The tender to state the price per ounce of strength commencing at 8 ounces or 4 degrees of Twaddel, for each butt of 108 gallons, for every half ounce of strength, as, for instance, from 8 oz. to 8½ oz., 8½ oz. to 9 oz., and so on, and ranging up to 18 ounces or 9 degrees of Twaddel.

Further particulars may be obtained on application to the Secretary, at the Chief Office of the Company, No. 11, George Yard, Lombard Street, where tenders are to be sent on or before Monday, Nov. 15, next.

The Directors do not bind themselves to accept the highest or any other tender.

FREDC. LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, AND OTHERS.

TENDER FOR TAR AND LIQUOR.

THE Directors of the Gravesend and Milton Gaslight Company are prepared to receive TENDERS for the Purchase of their Surplus TAR and AMMONIACAL LIQUOR for One or Two years from the 17th of November next.

The quantity of Tar will be about 65,000 gallons, and that of Liquor about 90,000 gallons in the year.

The Company will load into the Contractor's barges.

The average strength of the Liquor is about 12 ounces, but the Company will not guarantee that or any other strength.

Tenders for the Liquor must state the price at per butt of 108 gallons per ounce of strength.

Any further particulars can be obtained on application at the Works at Gravesend.

Tenders, marked "Tender for Tar, &c." to be sent to my Office, 27, King Street, Gravesend, on or before Wednesday, Nov. 3, next.

The Directors do not bind themselves to accept the lowest or any tender.

CHAS. R. GRAMSHAW, Secretary.

Gravesend.

HUCKNALL TORKARD CANNEL.

The HUCKNALL COLLIERY COMPANY can offer a Cannel producing a considerable quantity of Gas of good quality.

For analysis and price apply to the Company at their
HUCKNALL TORKARD COLLIERIES,
NEAR NOTTINGHAM.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

Now ready, Second Edition, price 7s., by post 7s. 3d., the

GAS MANAGER'S HANDBOOK.

By THOMAS NEWBIGGING, M.I.C.E.

Orders to be sent to

WALTER KING,

11, BOLT COURT, FLEET STREET, LONDON, E.C.

MR. CORBET WOODALL, C.E.,

Has Removed his Office to

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

NOTICE OF REMOVAL.

THE OWNERS OF

THE

BIRTLEY IRON-WORKS

AND

PELAW MAIN COLLIERIES

Have REMOVED their London OFFICES from No. 101, Cannon Street, to No. 46, Cannon Street.

Their Warehouse for Gas and Water Pipes and other Castings is at Scott's Wharf, Bankside, SOUTHWARK.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

BLACKBURN CORPORATION GAS DEPARTMENT.

EXHIBITION OF GAS OVENS, STOVES, ENGINES, BURNERS, AND OTHER APPLIANCES AND INVENTIONS FOR THE ECONOMIC USE OF GAS FOR DOMESTIC AND MANUFACTURING PURPOSES.

THE Gas Committee of the Blackburn Corporation have determined to hold an Exhibition as above stated in the

ASSEMBLY ROOMS, TOWN HALL, BLACKBURN,

To commence on the 10th of November, and continue for Twelve Days.

Any information required may be obtained from the undersigned,

S. R. OGDEN, Engineer and Manager.

Price 28s. each, handsomely bound in Morocco, cloth sides, gilt edged and lettered.

THE FIRST AND SECOND VOLUMES

OF

KING'S TREATISE

On the Science and Practice of the Manufacture and Distribution of

COAL GAS.

Edited by THOS. NEWBIGGING, C.E., M.Inst.C.E. and W. T. FEWTRELL, F.C.S.

Orders received by

WALTER KING, 11, Bolt Court, Fleet Street, London, E.C.

ANTI-CORRODO TUBES

(BARFF'S RUSTLESS PROCESS)

See Professor FOSTER'S *Article on "The Corrosion of Iron" in* JOURNAL *of March* 30, 1880.

THE RUSTLESS AND GENERAL IRON COMPANY

(JAMES E. AND SAMUEL SPENCER),

Makers of ANTI-CORRODO (BARFF'S) TUBES AND FITTINGS

For Gas, Steam, and Water; also Black Galvanized and Enamelled.

WORKS: West Bromwich. *Quotations and Pamphlet on application to* 97, CANNON STREET, LONDON, E.C. LIVERPOOL OFFICE: 34, Moorfields.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

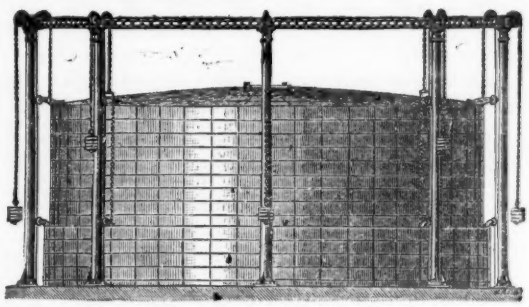
WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.



J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

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LINCOLN.

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

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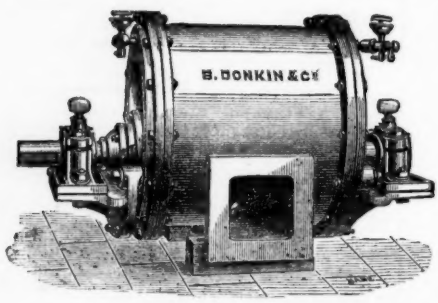

NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

MESSRS. B. DONKIN & Co. possess the sole right to manufacture J. Beale's Exhausters under his new patent.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

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Now Ready, Price One Guinea,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS.

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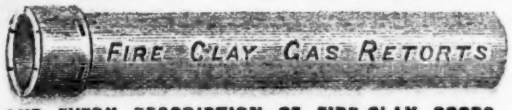
Manufacturers of FIRE-BRICKS, LUMPS, TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 18 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ½ brass to a 2-in. Socket.

May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

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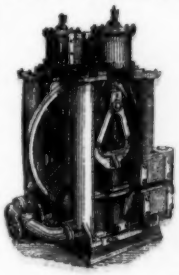

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Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

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ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

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WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

PARIS EXHIBITION, 1878.

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AND

HONOURABLE MENTION

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JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

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PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

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WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

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SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

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(ESTABLISHED 1851,)

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TELESCOPIC AND SINGLE-LIFT GASHOLDERS,

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IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,

PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,

TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

London Office: 9, FENCHURCH STREET, E.C.

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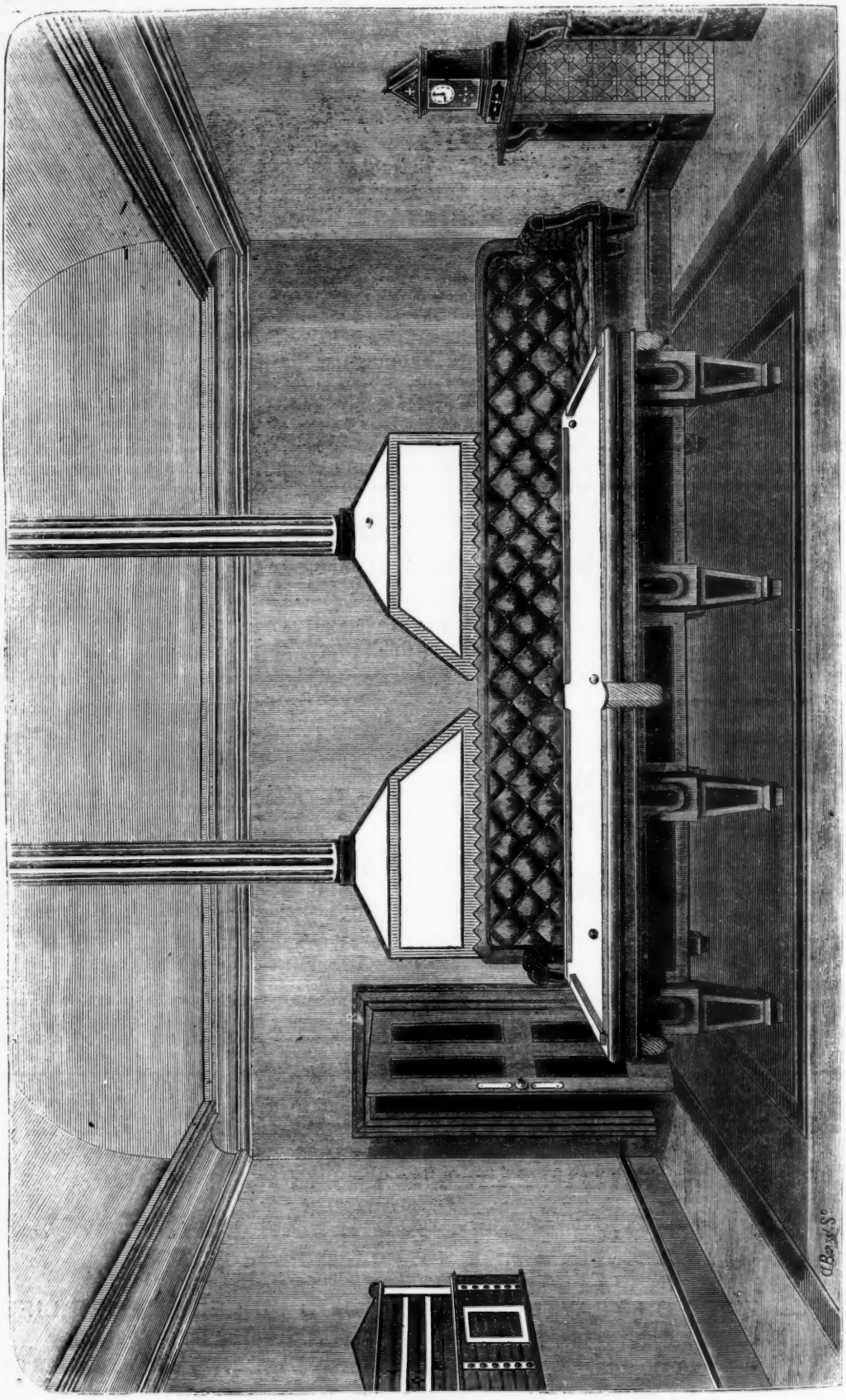
THE LATEST NOVELTY

FOR THE EFFECTIVE LIGHTING of BILLIARD TABLES.

BILLIARD TABLE LIGHTING BY WILLIAM SUGG'S PATENT SELF-VENTILATING SYSTEM AND BURNERS OF HIGH ILLUMINATING POWER,



Securing a Total Absence of Heat and Shadow, with a Steady and Brilliantly White Light, and Small Consumption of Gas.

N.B.—All products of combustion are carried away into the open air, and cannot, therefore, mix with and vitiate the atmosphere of the room.

One of the above has been fitted up in the Billiard-Room of the Raleigh Club, Regent Street, and the Secretary states that the Table is the best lighted he has ever seen.

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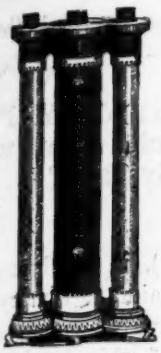
VINCENT WORKS, WESTMINSTER, & GRAND HOTEL BUILDINGS, CHARING CROSS.



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GAS OR OIL
HEATING AND LIGHTING
STOVES.

Silver Medal awarded in 1878, at Wolverhampton Exhibition.

No Injury to Pictures or Plants.
No Flue.
No Danger from Fire.
No Offensive Smell.
Light and Warmth combined.
Cost less than other Fuel.

Messrs. Ritchie & Co. are prepared to supply these Stoves on the best possible terms to Gas Companies to let out to their Consumers on the hire system.

Prices from 50s. to £10 10s.

Full Particulars and Testimonials forwarded on application to

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For Light & Heat.

R. DEMPSTER AND SON'S
WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,
MADE BY SPECIAL MACHINERY.
SCRUBBERS FILLED WITH BOARDS,
On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

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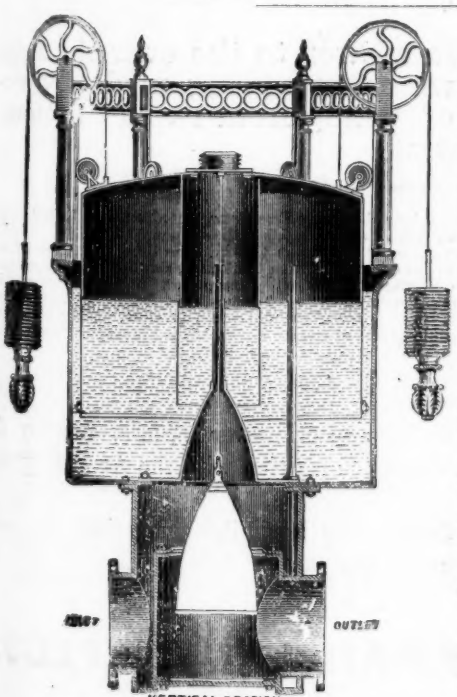
WET AND DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
ROUND STATION-METERS,
ON CAST-IRON STANDS;
SQUARE STATION-METERS,
WITH PLANED JOINTS.

Messrs. Braddock beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, Near NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

ESTABLISHED IN 1860.

BENJAMIN CARPENTER,
THE ORIGINAL MANUFACTURER OF THE IMPROVED
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
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TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Shipments Promptly and Carefully Executed.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Note.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
Recommended by Dr. Richardson.

Manufacturers:
J. F. FARWIG & CO.,
36, QUEEN STREET, CANNON ST., LONDON.

ERECTION of CHEMICAL PLANT.

SULPHATE OF AMMONIA APPARATUS.
Continuous Method.
Improved "Coffey Still" Process and other Methods.

Apparatus for Making Gray or White Sulphate of Ammonia from Nitrogenous Bodies.

Models of above plant supplied, price £3 10s. and £6 10s., or plans at moderate rates. Assistance given to persons making experiments.

JOHN G. HARVEY, 84, Cobourg Street, Leeds.

Gold Medal Awarded, Paris Exhibition, 1878.

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SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS,
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90, CANNON STREET, E.C.

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the **FLAT-FLAME BURNER** into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80*-candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot*) *by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80*-candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.

THE WARNER AND COWAN METER.

EXTRACTS FROM "THE HISTORY OF GAS-METERS," IN A MONTHLY TRADE JOURNAL.

"On examining the Patent Register, we find that during several years, although numerous patents have been granted for improvements in the instruments under consideration, there is only one which is worthy of attention, and that is certainly the most remarkable change introduced into the Gas-Meter since its first invention. We allude to the patent of Messrs. Warner and Cowan, by which the Wet Meter is made to measure practically correct under the various alterations of water-line within the range of the float, which range is considerably greater than in Meters of the ordinary construction.

* * * * * * *

"As we have shown, the first idea of constructing the machine originated with Clegg, and his crude apparatus was improved upon by John Malam, whose Meter was again improved by the joint efforts of Malam, Crosley, and perhaps Clegg. And the instrument as it left their hands sixty years ago is now employed throughout the world, without any material change, except that recently introduced by Warner and Cowan.

* * * * * * *

"This invention has been highly successful, and is to be commended for its efficiency and simplicity of construction, as it dispenses with the mechanism of compensating Meters."

W. & B. COWAN,

(ESTABLISHED 1827,)

DRY & WET GAS-METER MANUFACTURERS,

CHURCH ST., MILLBANK ST., LONDON, S.W. | DUTTON ST., NEW BRIDGE ST., MANCHESTER. | BUCCLEUCH ST. WORKS, EDINBURGH.

THE

MANN & WALKERS' PATENT SCRUBBER.

Extensive use. The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required. By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained. The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased. The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required. The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works. There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained. There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed. The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee. They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

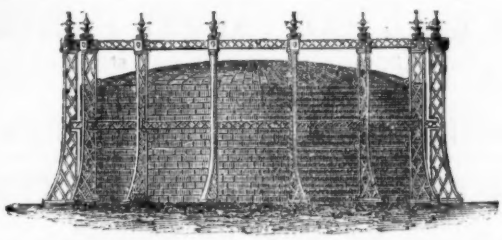
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 13,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

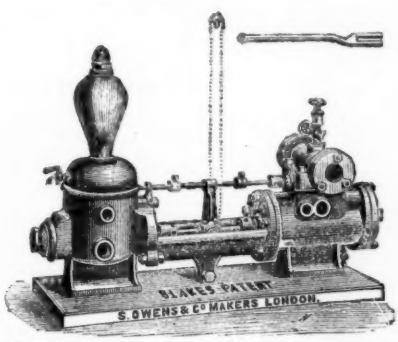
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

Upwards of 30 at The Gaslight and Coke Company's Works, Beckton.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

ALFRED LASS,

Fellow of the Institute of Chartered Accountants,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

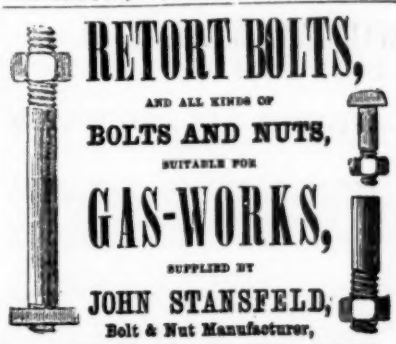
GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee, W. W. BOX, Gas-Works, Crayford, Kent.



RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

196, ST. VINCENT STREET, GLASGOW.

TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

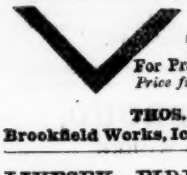
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of 16·67-candle gas, with 1420 lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: Mr. F. J. LEE SMITH, Bromley, KENT.



WOOD

TROUGHING

For Preserving Service-Pipes.

Price from Three-Farthings per Foot, In any Lengths.

THOS. PROUD,

Brookfield Works, Icknield St., Birmingham.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS,

LIMITED,

MANUFACTURERS OF

PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES,

BENDS, JUNCTIONS, &c.

Fire-Bricks, Tiles, Blocks, and Chimney-Tops.

IMPORTANT to GAS COMPANIES.

ENORMOUS SAVING.

JOHN ABBOT & CO., LIMITED,

OF SUFFOLK LANE, LONDON, AND GATESHEAD,

Manufacture and Erect

HYDRAULIC CRANES

For Discharging Coal Barges;

WAGGON HOISTS

For Lifting Coals to Retort-House Stageway;

CAPSTANS

For Moving Trucks about the Yard,

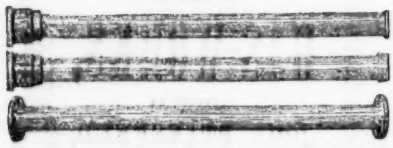
And Apparatus for Lifting PURIFIER COVERS.

Examples to be seen at Beckton, Hull, &c., &c.

WILLIAM MACLEOD & CO.,

30, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



Sole Agents in Scotland for the Torbay Paint Co.

Prices on application.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES.

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET, WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHER SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

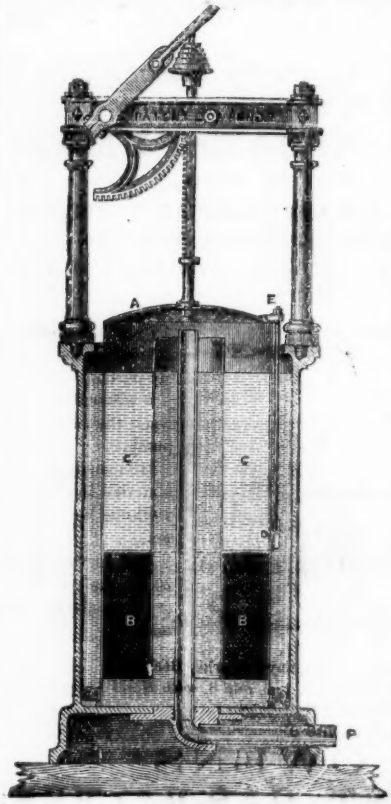
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application.

They are in use at

BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
NEWCASTLE-ON-TYNE,
RAMSGATE,
SUTTON,

and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 660.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

CANNEL AND GAS COALS.

THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

DUKINFIELD, NEAR MANCHESTER.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

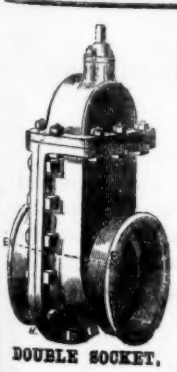
COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.



DOUBLE SOCKET.

IMPROVED SCREW-VALVES,

For Water, Tar, Ammoniacal Liquor, &c.

MADE EITHER WITH FLANGED OR SOCKET ENDS.

B. DONKIN & Co.

BERMONDSEY, LONDON, S.E.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Prices are Reduced.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,

(Established 1820.)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

NEW PATENT WET GAS-METER,
THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

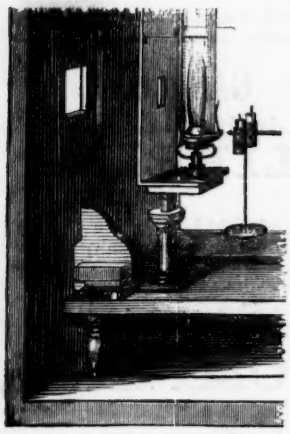
SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON.



ERRORS IN THE PHOTOMETRIC ESTIMATION OF THE VALUE OF GAS are AVOIDED by the use of

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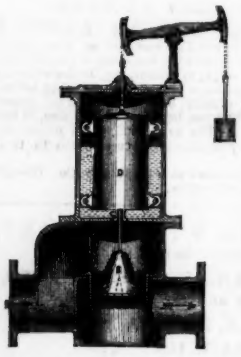

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